Hecate Strait Groundfish Bottom Trawl Survey, May 26th to June 21st, 2009

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Fisheries and Oceans Canada
Science Branch, Pacific Region
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by

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ABSTRACT

Olsen, N., Rutherford, K.L., Stanley, R.D., and Wyeth, M.R. 2009. Hecate Strait groundfish bottom trawl survey, May 26th to June 21st, 2009. Can. Manuscr. Rep. Fish. Aquat. Sci. 2901: vi + 49 p.

A bottom trawl survey of Hecate Strait was conducted on the Canadian Coastguard Ship W. E. Ricker between May 26th and June 21st, 2009. This was the third survey in what is intended to be a long-term survey series, coordinated with other area-specific surveys that together cover the continental shelf and upper slope of most of the British Columbia coast. The objective of these surveys is to provide fishery-independent abundance indices of all demersal fish species available to bottom trawling, as well as to collect biological samples of selected species.

The survey conducted 156 successful tows from a total of 163. The mean catch per successful tow was 370 kg, averaging about 21 different species of fish and invertebrates in each. The most abundant fish species encountered was arrowtooth flounder (*Atheresthes stomias*) followed by spotted ratfish (*Hydrolagus colliei*), sablefish (*Anoplopoma fimbria*), rex sole (*Glyptocephalus zachirus*), and English sole (*Parophrys vetulus*). Biological data, including individual length, weight, sex, maturity, and age structure were collected from 64 different species of fish. Oceanographic data and net geometry were also recorded for most tows, including water temperature, depth, headrope height, and doorspread.

RÉSUMÉ

Olsen, N., Rutherford, K.L., Stanley, R.D., and Wyeth, M.R. 2009. Hecate Strait groundfish bottom trawl survey, May 26th to June 21st, 2009. Can. Manuscr. Rep. Fish. Aquat. Sci. 2901: vi + 49 p.

Un relevé au chalut de fond a été réalisé, du 26 mai au 21 juin 2009, dans le détroit d'Hécate par le navire W.E. Ricker de la Garde côtière canadienne. Il s'agit du troisième relevé d'une série d'échantillonnages qui se veulent à long terme et qui sont coordonnés avec d'autres échantillonnages par secteur couvrant, ensemble, la plate-forme continentale et la partie supérieure du talus de la majeure partie de la côte de la Colombie-Britannique. L'objectif de ces échantillonnages est d'établir des indices d'abondance, indépendants de la pêche, de toutes les espèces de poissons démersaux capturables au chalut de fond et de recueillir des données biologiques sur les espèces sélectionnées.

Des 163 traits de chalut réalisés, 156 ont été fructueux. La prise moyenne par trait pesait 370 kg. Quelque 21 espèces différentes de poissons et d'invertébrés ont été prises en moyenne à chaque trait. La plie à grande bouche (*Atheresthes stomias*) a été l'espèce la plus abondante; venaient ensuite la chimère d'Amérique (*Hydrolagus colliei*), la morue charbonnière (*Anoplopoma fimbria*), la sole américaine (*Glyptocephalus zachirus*) et la sole anglaise (*Parophrys vetulus*). Des données biologiques (longueur, poids, sexe, stade de maturité et structure d'âge) ont été recueillies pour 64 espèces différentes de poisson. Des données océanographiques et des données sur la géométrie du chalut (température de l'eau, profondeur, hauteur de la ralingue supérieure et écartement des panneaux) ont également été recueillies pour la plupart des traits.

INTRODUCTION

In 2003 a report by the Pacific Scientific Advice Review Committee (PSARC) recommended development of fishery-independent relative abundance indices using bottom trawl surveys in British Columbia waters (Sinclair et al., 2003). As an initial step, it recommended that a pilot survey be conducted in PMFC major areas 5A and 5B (Queen Charlotte Sound). This region was recommended in part because it is not covered by other bottom trawl surveys and it represents a significant portion of the commercial bottom trawl fishery.

The first Queen Charlotte Sound survey was successfully completed in the summer of 2003 (Olsen et al., 2007). Following that, additional surveys were planned for the west coast of Vancouver Island beginning in 2004, Hecate Strait beginning in 2005, and the west coast of the Queen Charlotte Islands beginning in 2006. These surveys are to be conducted on a rotating biennial schedule with the Queen Charlotte Sound and Hecate Strait surveys conducted in odd-numbered years and the west coast Vancouver Island and west coast Queen Charlotte Islands surveys conducted in even-numbered years. Together they provide comprehensive coverage of the continental shelf and upper slope of the British Columbia Coast (Figure 1).

This document provides a brief synopsis of the 2009 Hecate Strait groundfish bottom trawl survey, including the methods used and data collected. It is not intended as a comprehensive review of the survey, nor does it provide interpretive analysis of the survey results. Reports of the previous two Hecate Strait surveys are given in Workman et al., 2008 and Olsen et al., 2009.

METHODS

VESSEL AND FISHING GEAR

The survey was conducted aboard the Canadian Coast Guard Ship CCGS W. E. Ricker (Figure 2). The trawl net used was an Atlantic Western IIA box trawl (Table 1; Figure 3) connected to 1,100 kg U.S.A. Jet doors.

STAFF SUMMARY

A total of 14 personnel were involved in the survey, which was split into 2 legs of 14 and 15 days each, respectively, with 7 staff in each (Table 2).

SURVEY DESIGN

The study area consists of Hecate Strait, from approximately latitude 52° 40' N to latitude 54° 40' N and westward into Dixon Entrance to approximately longitude 133° 00' W, covering depths from 10 to 500 meters (Figure 4), and categorized into four distinct strata (Table 3; Figure 4). The southern region of this survey is nearly contiguous with the most northerly extent of the Queen Charlotte Sound survey.

We divided the survey area into a contiguous grid of 4 km^2 blocks and from these blocks we randomly selected 121 fishing locations. The number of locations and the allocation of locations across strata were based on an analysis by Sinclair et al. (2003) and were intended to minimize observational error for the most important commercial groundfish species (Figure 5).

OPERATIONS

Fishing

Fishing commenced at approximately 7 AM and ended at approximately 7 PM each day, to coincide with the ship's 12 hour crew rotation schedule.

Prior to fishing, the fishing master and chief scientist reviewed the selected fishing locations to determine a candidate set of locations to visit throughout the day. During this review process the fishing master would sometimes determine, based on his experience and knowledge of an area, that one or more locations were not fishable. In such cases we would mark the locations as "rejected based on prior knowledge".

We frequently began fishing immediately on arrival at a fishing location. However, if the fishing master was not familiar with an area we would "sound" the region (traverse the location and examine the depth sounder trace) to determine if it was suitable for trawling. If it was not, we marked the location and "rejected based on inspection".

When trawling, the fishing master would attempt to tow through the center of the 4 km^2 fishing block, usually following a depth contour. However, where the bottom topography made this difficult or impossible, the fishing master would trawl wherever he felt he could obtain a successful result, with the stipulation that at least half of the total

trawl track had to be within the 4 km^2 block (Figure 6). The scope used in 2009 is shown in Table 4 and Figure 7.

To determine the start of each 20 minute tow, we monitored the real-time net sensor data to establish when the net reached the sea floor, at which point we considered the net to be actively fishing. Nineteen minutes after the start of the tow, we retrieved the net. Retrieval was done one minute early because slack in the warps creates a lag of about one minute before the net leaves the bottom. Although our target on-bottom time was 20 minutes, we accepted tows that were at least 15 minutes in length. This was a pragmatic decision that allowed us to retain many tows that would otherwise have been failures due to hang-ups or early haul-backs.

The result of trawling was either a successful tow, or a hang-up or tear-up of the trawl net. In the event of a hang-up or tear-up, we would either mark the location as "rejected after one or more attempts to fish" or make additional attempts to fish. Thus, we kept records of the three scenarios that resulted in a location being removed from the sampling frame:

- Rejection based on prior knowledge
- Rejection based on on-ground inspection
- Rejection based on one or more failed fishing attempts

Rejected locations were removed from the sampling frame for the current and all future surveys. Thus, every year of the survey results in the removal of some unfishable area, which over time, will lead to increasing efficiency (i.e. we will spend less time surveying areas that cannot be fished).

Gear and Oceanographic Sensors

The trawl net was equipped with a Simrad ITI Trawl System that provided real-time net depth, doorspread and wingspread values. These data allowed us to continually monitor the net during fishing. In addition to these real-time sensors, we also attached data-logging probes to collect water temperature and pressure/depth (Seabird SBE 39), dissolved oxygen, pH, salinity, temperature, and depth (Seabird SBE 19plus), and contact of the trawl net with the sea floor (NMFS Bottom Contact Sensor). Data from these logging probes were downloaded at the end of each day.

Catch Processing

At the end of each tow, the net was retrieved and the catch dumped into a hopper in the fish processing lab. Catch was sorted by species into separate baskets as it moved along a conveyor system. Baskets were weighed to the nearest 0.1 kg using a large capacity, motion-compensating electronic balance (Marel Model M1100/M2000, 60 kg capacity). For small catches the number of individuals was often recorded as well as the weight. Catch was sorted to the lowest taxonomic group possible. For most fishes this was to the level of species; invertebrates, however, were often only keyed to phylum or order.

Biological Sampling

While the primary purpose of this survey was to generate fishery independent indices of relative abundance, our second goal was to collect associated biological information on the size, sex, and age composition of selected species. In particular, our biological sampling priorities were to collect length and sex frequencies on all species in the catch of each tow (subject to a minimum number of specimens criteria), to collect representative samples of specimen length and weight, and to collect age samples for select species.

We selected age samples from the dominant (by weight) catch in each tow, as well as certain species deemed high priority due to concerns over stock status (for example, Bocaccio, lingcod, and Pacific cod). Otoliths (calcareous accretions of the inner ear) were collected from rockfish and flatfish species while fin clips were taken from lingcod and Pacific cod. Both of these structures grow in a series of annular rings that can be counted to determine age.

RESULTS

FISHING

We divided the survey into 2 legs of 14 and 15 days each. The overall pattern of vessel movement during each leg is shown in Figure 8.

From a total of 27 survey days, 5 days were required for travel at the start and end of the survey, 1 day was required for crew changes, and almost a whole day (May 29th) was required to transport a staff member to a medical facility. Thus, we ended with a total of about 20 full fishing days, in which time we conducted 163 tows, of which 156 were successful and 7 were unsuccessful due to hang-ups or tear-ups, for an average of about 7 successful tows per fishing day (Table 5).

The final status of the 2009 sampling frame includes 156 successfully fished locations, 17 locations rejected prior to fishing, based on the fishing master's knowledge, 41 locations rejected based on on-ground inspection, and 6 locations rejected after one or more failed fishing attempts (Figure 9). One location was left un-inspected and un-fished due to time constraints at the end of the survey.

CATCH

Catch weight per tow was typically less than 1,500 kg and on average, we observed about 10 to 30 species per tow (Figure 10 and Figure 11). We caught a total of 57,920 kg of fish and invertebrates. Most of this (57,098 kg) consisted of 109 different taxonomic groups of fish, including 28 rockfish taxa and 17 flatfish taxa. The remainder (822 kg) consisted of 130 invertebrate groups (Table 6). Of the fish species, arrowtooth flounder (*Atheresthes stomias*) was the dominant by weight, followed by spotted ratfish (*Hydrolagus colliei*), sablefish (*Anoplopoma fimbria*), rex sole (*Glyptocephalus zachirus*), and English sole (*Parophrys vetulus*) (Table 7). Biomass indices over the history of the survey (2005, 2007, and 2009) are shown for selected species in Figure 12.

SAMPLES AND SPECIMENS

We sampled 64 species of fish for attributes such as length, weight, sex, maturity, and age (Table 8, Table 9, and Table 10).

GEAR AND OCEANOGRAPHIC SENSORS

We collected Seabird 39 data (water temperature and depth) from 158 tows and Seabird 19plus data (water temperature, depth, pH, salinity, and dissolved oxygen from 158 tows (Table 11, Figure 13). Although we have not yet analyzed these data in detail, they may prove useful for explaining, or at least correlate to, short term anomalies in abundance trends. In addition, they provide a base reference for detecting future climate change.

We collected bottom contact data from the NMFS Bottom Contact Sensor from 160 tows (Table 11). These data provide a record of the trawl net contact with the sea floor and thus are useful not only for determining the quality and quantity of the sea floor contact, but also indicate the relative rugosity of the sea floor. We use these data to determine the exact times that the trawl net first and last contacts the sea floor, thus providing an accurate measure of total bottom contact time (Figure 14).

REFERENCES

Olsen, N., Workman, G. D., and Stanley, R. D. 2007. Queen Charlotte Sound Groundfish Bottom Trawl Survey July 3rd to August 10th, 2003. Can. Manuscr. Rep. Fish. Aquat. Sci. 2782: 58 p.

Olsen, N., Rutherford, K.L., Stanley, R.D., and Wyeth, M.R. 2009. Hecate Strait groundfish bottom trawl survey May 22nd to June 19th, 2007. Can. Manuscr. Rep. Fish. Aquat. Sci. 2900: vi + 48 p.

Sinclair, A., Schnute, J., Haigh, R., Starr, P., Stanley, R. D., Fargo, J., and Workman, G. 2003. Feasibility of multispecies groundfish bottom trawl surveys on the BC coast. Can. Stock Assess. Sec. Res. Doc. 2003/049.

Workman, G.D, Rutherford, K.L., and Olsen, N. 2008. Hecate Strait groundfish bottom trawl survey, May 25th to June 29th, 2005. Can. Manuscr. Rep. Fish. Aquat. Sci. 2805: vi + 53 p.

Table 1. Net specifications.

Part	Standard Length	Material	Metric Length	Units	Material
Rigging					
Sweep Line	90	7/8 cable	27.4	m	22 mm cable
Upper bridle	90	3/4 cable	27.4	m	19 mm cable
Lower bridle	90	7/8 cable	27.4	m	22 mm cable
Door Legs	36	7/8 cable	11	m	22 mm cable
Pickups	42	7/8 cable	12.8	m	22 mm cable
Hook ups	8.8 t	BMMDV80	8 mt	mt	BMMDV80
Net frame					
Headline	74.5	5/8 cable	22.7	m	16 mm cable
Headline floats	90	8" plastic Spheres			200 mm plastic spheres
Riblines		1" Polysteel rope			25 mm polysteel rope
Bolsch Line	68.33	9/8" poly steel rope	20.8	m	29 mm polysteel rope
Fishing Line	107.33	14 mm long link chain	32.7	m	14 mm long link chain
Foot Rope					
Foot Rope	107.33	5/8 Chain	32.7	m	16 mm chain
Foot rope bosom	14	16 in Tire gear with 2 in Spacing	4.3	m	400 mm tire gear with 50 mm spacing
Root rope wing1	18.33	18" rock hopper, 18 " disks spaced 18 " apart	5.6	m	450 mm rock hopper 450 mm spacing
Root rope wing2	8.83	18" rock hopper, 18 " disks spaced 18 " apart	2.7	m	450 mm rock hopper 450 mm spacing
Web					
Belly	5"	3.5 mm Euroline	127	mm	3.5 mm Euroline
Square	5"	3.5 mm Euroline	127	mm	3.5 mm Euroline
Side Panel	5"	3.5 mm Euroline	127	mm	3.5 mm Euroline
Taper	4.5"	3.5 mm Euroline	114	mm	3.5 mm Euroline
Intermediate	4.5"	3.5 mm Euroline	114	mm	3.5 mm Euroline
Codend	4.5"	3.5 mm Euroline	114	mm	3.5 mm Euroline
Guard Mesh	4.5 or 5 "	Double 4.5 mm Euroline	114 or 127	mm	Double 4.5 mm Euroline
Liner	3/4"	Notless Nylon	19	mm	Notless Nylon

Table 2. Science staff on each leg of the survey.

Leg	Dates	Staff
1	May 26th to June 7th	Bill Andrews Tom Hurlbut Brian Krishka Matt McKay Brock Medlar Norm Olsen * Kate Rutherford **
3	June 8th to June 23rd	Schon Acheson Kristina Anderson Jackie Detering Jeff Fargo * Rob Kronlund Bernie White Malcolm Wyeth **

* Chief scientist

** Lab boss

Table 3. Definition of survey strata with the target tow allocation and the total area in each.

Depth								Target Tow	Actual Tow	Usable	Area
Meters				Fathoms				Allocation	Allocation	Tows	(km^2)
10	-	70		5	-	38		60	90	53	5,958
70	-	130		38	-	71		45	56	43	3,011
130	-	220		71	-	120		40	57	48	2,432
220	-	500		120	-	273		15	18	12	1,858
Totals								**160**	**221**	**156**	**13,259**

Table 4. Mean warp length and scope by depth interval.

Depth (m)			Mean Warp (m)	Mean Warp (fa)	Mean Scope	Mean Depth (fa)
10	-	50	115	63	3.5	18
50	-	100	201	110	2.6	42
100	-	150	320	175	2.6	68
150	-	200	407	222	2.4	94
200	-	250	477	261	2.2	120
250	-	300	513	280	2.0	140

Table 5. Summary of survey operations.

Date	Start Fishing	End Fishing	Hours Fishing	Successful Tows	Failed Tows	Total Tows	Travel Day	Crew Change
5/26/2009	-	-	-	-	-	-	✓	
5/27/2009	-	-	-	-	-	-	✓	
5/28/2009	7:42	18:01	11	6	2	8		
5/29/2009	7:21	8:50	1	2	0	2		
5/30/2009	7:12	18:16	11	10	0	10		
5/31/2009	7:27	18:46	11	7	1	8		
6/1/2009	7:16	18:52	11	8	2	10		
6/2/2009	7:19	18:38	11	7	0	7		
6/3/2009	7:06	18:57	11	11	0	11		
6/4/2009	7:20	18:06	11	5	1	6		
6/5/2009	7:39	17:10	10	7	0	7		
6/6/2009	7:10	18:02	11	6	1	7		
6/7/2009	7:19	10:00	3	3	0	3		
6/8/2009	-	-	-	-	-	-		✓
6/9/2009	7:34	18:57	11	10	0	10		
6/10/2009	7:20	18:35	11	9	0	9		
6/11/2009	7:16	17:01	10	10	0	10		
6/12/2009	7:14	17:21	10	8	0	8		
6/13/2009	7:25	18:26	11	8	0	8		
6/14/2009	7:23	18:19	11	8	0	8		
6/15/2009	7:13	18:53	11	7	0	7		
6/16/2009	7:16	18:40	11	8	0	8		
6/17/2009	7:14	17:05	10	7	0	7		
6/18/2009	7:13	18:31	11	9	0	9		
6/19/2009	-	-	-	-	-	-	✓	
6/20/2009	-	-	-	-	-	-	✓	
6/21/2009	-	-	-	-	-	-	✓	
Total			**209**	**156**	**7**	**163**	**5**	**1**
Average Per Day			**10.0**	**7.4**	**0.3**	**7.8**		

Table 6. Catch broken down by species groups.

Species Category	Number of Taxa	Weight (kg)
All fish	109	57,098
Rockfish	28	4,120
Flatfish	17	33,667
Roundfish	7	8,908
Cartilaginous fish	6	10,030
Other fish	51	373
Invertebrates	130	822

Table 7. All captured species showing number of tows in which the species occurred, total catch weight, maximum and mean per-tow catch weight, and relative abundance and relative error from bootstrapped area expanded estimates.

Species	Number of Tows	Catch Weight (kg) Total	Maximum	Mean	Biomass (tonnes)	Relative Error
Arrowtooth flounder	131	19,040.4	2,528.4	145.3	12,871.0	0.18
Spotted ratfish	152	8,038.9	664.1	52.9	6,891.0	0.15
Sablefish	57	3,946.6	1,675.2	69.2	4,158.5	0.59
Rex sole	115	3,459.7	280.2	30.1	2,238.1	0.12
English sole	96	3,074.3	302.0	32.0	2,772.8	0.20
Dover sole	109	2,929.3	439.7	26.9	2,073.7	0.19
Pacific cod	106	2,625.8	845.4	24.8	2,465.1	0.44
Walleye pollock	86	1,727.3	343.0	20.3	1,031.2	0.27
Pacific halibut	93	1,622.2	173.5	17.4	1,698.6	0.14
Southern rock sole	65	1,506.0	198.7	23.2	1,871.5	0.22
Spiny dogfish	115	1,321.5	238.2	11.5	1,008.1	0.20
Silvergray rockfish	58	1,260.2	224.3	21.7	601.3	0.23
Pacific ocean perch	60	763.8	368.5	12.9	506.0	0.43
Yellowtail rockfish	30	595.8	115.8	19.9	332.0	0.29
Flathead sole	60	491.7	50.1	8.5	330.5	0.21
Redbanded rockfish	43	474.5	66.0	11.0	317.3	0.18
Pacific sanddab	38	453.9	142.4	11.9	499.7	0.42
Sand sole	42	403.6	110.5	9.6	545.2	0.32
Big skate	19	343.5	91.0	18.1	382.1	0.29
Canary rockfish	20	309.0	184.5	15.5	140.5	0.58
Lingcod	64	286.6	32.6	4.5	243.7	0.19
Longnose skate	31	279.0	27.3	9.0	215.4	0.20
Petrale sole	62	266.6	52.0	4.3	227.6	0.31
Shortspine thornyhead	36	208.2	29.3	5.8	167.5	0.24
Starry flounder	2	194.4	193.2	97.2	289.9	1.01
Quillback rockfish	31	188.3	37.1	6.1	184.5	0.40
Pacific tomcod	25	159.9	54.5	6.4	187.5	0.49
Eulachon	60	145.6	17.1	2.5	100.9	0.16
All species	7	141.0	47.6	20.1		
Primnoa	5	140.3	130.8	35.1		
Butter sole	26	127.1	35.3	4.9	157.9	0.41
Pacific herring	35	115.2	16.6	3.3	145.5	0.24
Pacific hake	20	110.7	47.8	5.5	134.7	0.57
Dungeness crab	13	84.6	18.0	6.5		
Copper rockfish	13	78.5	26.6	6.0	90.7	0.49
Metridium	21	73.5	16.3	3.5		
Pink shrimp (smooth)	81	70.5	5.3	1.0		
Redstripe rockfish	12	69.5	26.0	5.8	23.2	0.60
Sunflower starfish	27	69.5	18.6	2.8		
Slender sole	42	51.4	10.7	1.2	40.4	0.21
Kelp greenling	19	51.1	12.1	2.7	64.5	0.39
Schoolmaster gonate squid	15	50.2	13.4	3.3		
Curlfin sole	24	44.1	12.5	1.8	48.4	0.29
Jellyfish	70	41.7	7.3	0.6		

Table 7. Continued

Species	Number of Tows	Catch Weight (kg) Total	Maximum	Mean	Biomass (tonnes)	Relative Error
Rougheye rockfish	20	39.5	6.6	2.0	39.9	0.29
Sidestripe shrimp	52	35.9	4.0	0.7		
Bocaccio	6	34.6	10.7	5.8	16.8	0.43
Sandpaper skate	14	32.7	13.0	2.3	32.4	0.64
Pacific sand lance	26	32.3	10.5	1.5	37.3	0.42
Anemone	14	31.8	14.7	2.3		
Pink short-spined star	26	30.6	7.2	1.2		
Fragile urchin	40	27.5	3.7	0.7		
Widow rockfish	9	26.6	15.2	3.0	11.2	0.58
Heart urchins	18	21.4	4.7	1.3		
Mud star	22	19.9	3.9	1.2		
Greenstriped rockfish	13	19.7	5.3	1.5	10.8	0.35
Glass sponges	9	18.3	7.8	2.6		
Yelloweye rockfish	4	17.5	5.6	4.4	10.4	0.62
Giant red sea cucumber	13	16.1	4.5	1.2		
Bigmouth sculpin	6	16.1	3.8	2.7	6.6	0.53
Sharpchin rockfish	21	14.9	8.8	0.7	8.1	0.60
Snake prickleback	24	14.3	5.1	0.8	19.0	0.39
Aleutian skate	2	14.0	7.7	7.0	18.8	0.66
Sand star	12	13.3	8.7	1.1		
Cheiraster dawsoni	18	8.3	2.9	0.6		
Wattled eelpout	8	7.8	3.3	1.1	4.1	0.47
Blackbelly eelpout	24	7.2	1.9	0.4	4.4	0.35
Spiny scallop	13	6.7	1.6	0.5		
Sponges	16	6.4	1.9	0.5		
Pink scallop, (aka reddish scallc	21	6.1	1.4	0.3		
Sturgeon poacher	31	6.1	1.3	0.2	6.9	0.28
Sea pen	14	5.8	4.3	0.5		
Pacific staghorn sculpin	4	4.6	2.2	1.2	6.5	0.59
Prawn	19	4.4	1.5	0.3		
Longfin smelt	1	3.9	3.9	3.9	4.6	0.95
Shortraker rockfish	1	3.4	3.4	3.4	1.8	0.98
Blackfin sculpin	22	3.3	1.4	0.3	1.8	0.51
Soft sea cucumber	2	3.0	3.0	3.0		
Leather star	5	2.9	1.0	0.6		
Giant pacific octopus	3	2.9	2.6	1.4		
Euphausiids	2	2.8	1.7	1.4		
Roughback sculpin	26	2.8	0.5	0.1	3.6	0.25
Harlequin rockfish	3	2.6	1.4	0.9	1.3	0.65
Chinook salmon	2	2.4	1.7	1.2	3.3	0.78
Yellowfin sole	4	2.4	1.4	0.6	3.7	0.66
Pagurinae	3	2.4	1.9	0.8		
Yellowmouth rockfish	9	2.2	1.2	0.4	1.4	0.65
Dusky rockfish	2	2.1	1.4	1.1	0.9	0.73

Table 7. Continued

Species	Number of Tows	Catch Weight (kg) Total	Maximum	Mean	Biomass (tonnes)	Relative Error
Black rockfish	2	1.9	1.6	0.9	2.6	0.84
Starfish	2	1.9	1.9	1.9		
China rockfish	1	1.6	1.6	1.6	2.2	1.04
Opalescent inshore squid	15	1.6	0.5	0.2		
Darkblotched rockfish	5	1.6	0.4	0.3	1.7	0.53
Barnacles	1	1.5	1.5	1.5		
Pink shrimp (flexed)	9	1.4	1.0	0.2		
Coonstripe shrimp	10	1.4	0.5	0.2		
Splitnose rockfish	6	1.4	0.5	0.2	1.3	0.42
Pacific sandfish	2	1.3	1.1	0.7	1.9	0.85
Glass shrimp	5	1.3	0.9	0.4		
Tiger rockfish	1	1.3	1.3	1.3	2.2	1.03
Shiner perch	9	1.2	0.8	0.1	1.8	0.70
Buffalo sculpin	8	1.1	0.5	0.2	1.1	0.49
Sea whip	10	1.1	0.3	0.1		
Cushion star	7	1.0	0.7	0.3		
Red irish lord	5	1.0	0.3	0.2	1.0	0.48
Pallid urchin	8	1.0	0.4	0.2		
Threadfin sculpin	4	1.0	0.5	0.2	0.4	0.77
Bigfin eelpout	2	0.9	0.5	0.5	1.1	0.77
Graceful decorator crab	24	0.9	0.2	0.1		
Pygmy rockfish	4	0.9	0.7	0.2	0.6	0.77
Shortfin eelpout	10	0.9	0.3	0.1	0.5	0.41
Black hagfish	2	0.9	0.5	0.5	1.5	0.64
Fish eggs	7	0.8	0.5	0.2		
Bath sponges	2	0.8	0.7	0.4		
Great sculpin	3	0.8	0.6	0.3	0.9	0.72
Basket star	3	0.7	0.3	0.2		
Whitespotted sea cucumber	2	0.7	0.4	0.3		
Oregontriton	6	0.7	0.5	0.2		
Mottled star	1	0.7	0.7	0.7		
Slim sculpin	12	0.7	0.3	0.1	0.6	0.50
Puget sound rockfish	2	0.6	0.6	0.3	0.0	0.94
Scallop	3	0.6	0.4	0.2		
Black eelpout	7	0.5	0.2	0.1	0.8	0.42
Spiny red sea star	3	0.5	0.2	0.2		
Tunicata	11	0.5	0.2	0.1		
Ophiuridae	7	0.5	0.3	0.2		
Squids	2	0.5	0.4	0.2		
Common two-spined crangon	12	0.4	0.3	0.1		
Molpadiidae	1	0.4	0.4	0.4		
Pagurus brandti	2	0.4	0.4	0.4		
Halocynthia	2	0.4	0.4	0.4		
Humpback shrimp	5	0.3	0.2	0.1		
Rosy tritonia	9	0.3	0.2	0.1		
Sweet potato sea cucumber	1	0.3	0.3	0.3		

Table 7. Continued

Species	Number of Tows	Catch Weight (kg) Total	Maximum	Mean	Biomass (tonnes)	Relative Error
Fish-eating star	4	0.3	0.1	0.1		
Ribbed sculpin	7	0.3	0.1	0.0	0.3	0.54
Red rock crab	1	0.2	0.2	0.2		
Octopus	4	0.2	0.1	0.1		
Pacific lamprey	2	0.2	0.2	0.1	0.1	0.72
Vermillion starfish	2	0.2	0.2	0.1		
Cookie star	1	0.2	0.2	0.2		
Euphausia	1	0.2	0.2	0.2		
Tadpole sculpin	8	0.2	0.1	0.1	0.2	0.57
C-o sole	1	0.2	0.2	0.2	0.3	1.02
Hippasteria	1	0.2	0.2	0.2		
Pseudarchaster alascensis	7	0.2	0.1	0.0		
Sea cucumbers	5	0.2	0.1	0.1		
Echiurida	1	0.2	0.2	0.2		
Gastropods	4	0.2	0.2	0.2		
Gorgonocephalus	1	0.2	0.2	0.2		
Pacific bobtail squid	30	0.2	0.0	0.0		
Solaster paxillatus	1	0.2	0.2	0.2		
Striped sun starfish	2	0.2	0.2	0.2		
Furrowed rock crab	5	0.2	0.1	0.1		
Northern spearnose poacher	4	0.2	0.1	0.1	0.2	0.62
Asteriidae	2	0.1	0.1	0.1		
Dipsacaster borealis	1	0.1	0.1	0.1		
Ascidians and tunicates	14	0.1	0.1	0.0		
California armina	7	0.1	0.1	0.0		
Brown irish lord	1	0.1	0.1	0.1	0.0	0.99
Gephyreaster swifti	1	0.1	0.1	0.1		
Ophiura sarsi	7	0.1	0.1	0.1		
Ophiopholis aculeata	3	0.1	0.1	0.1		
Shrimp	2	0.1	0.1	0.1		
Pterasteridae	4	0.1	0.1	0.1		
Polychaete worms	6	0.1	0.1	0.1		
Sea lilies and feather stars	3	0.1	0.1	0.1		
Daubed shanny	4	0.1	0.1	0.1	0.0	1.04
Rose starfish	9	0.1	0.0	0.0		
Smooth sun star	1	0.1	0.1	0.1		
Spike shrimp (horned shrimp)	13	0.1	0.0	0.0		
Basket stars	1	0.1	0.1	0.1		
Speckled sanddab	1	0.1	0.1	0.1	0.1	1.00
Grunt sculpin	2	0.0	0.0	0.0	0.0	0.69
Henricia	9	0.0	0.0	0.0		
Ophiacanthidae	2	0.0	0.0	0.0		
Platyhelminthes	1	0.0	0.0	0.0		
Rockfishes	1	0.0	0.0	0.0		
Sand dollars	1	0.0	0.0	0.0		
Warty poacher	1	0.0	0.0	0.0	0.1	0.99

Table 7. Continued.

Species	Number of Tows	Catch Weight (kg) Total	Maximum	Mean	Biomass (tonnes)	Relative Error
Arctic surfclam	1	0.0	0.0	0.0		
Blacktip poacher	1	0.0	0.0	0.0	0.0	1.00
Bryozoa	8	0.0	0.0	0.0		
Bivalve molluscs	5	0.0	0.0	0.0		
Crangons	35	0.0	0.0	0.0		
Dipsacaster anoplus	1	0.0	0.0	0.0		
Doridídae	7	0.0	0.0	0.0		
Pacific spiny lumpsucker	4	0.0	0.0	0.0	0.0	0.92
Sand lances	1	0.0	0.0	0.0		
Sculpins	2	0.0	0.0	0.0		
Sea mouse	3	0.0	0.0	0.0		
Six-rayed starfish	1	0.0	0.0	0.0		
Spotfin sculpin	1	0.0	0.0	0.0	0.0	0.99
Bigeye poacher	6	0.0	0.0	0.0	0.0	0.97
California headlightfish	1	0.0	0.0	0.0	0.0	1.01
Northern ronquil	3	0.0	0.0	0.0	0.0	0.97
Spider crabs	3	0.0	0.0	0.0		
Amphiophiura ponderosa	1					
Aphroditidae	1					
Blackfin poacher	1					
Blood star	1					
Cancer crabs	2					
Common argid	3					
Crangonidae	1					
Henricia sanguinolenta	5					
Heptacarpus flexus	3					
Isopods	20					
Lampshells	3					
Left-handed hermits	2					
Lophaster furcilliger vexator	1					
Morning sun starfish	1					
Nelson's argid	7					
Northern argid	1					
Northern lampfish	4					
Northern sculpin	1					
Ophiopholis	2					
Ophiura	7					
Pacific krill	1					
Pacific lyre crab	1					
Pacific rock crab	2					
Pacific viperfish	4					
Paguroidea	1					
Pagurus	2					
Peanutworms	1					
Prickly snailfish	2					
Pubescent porcelain crab	1					

Table 7. Continued.

Species	Number of Tows	Catch Weight (kg) Total	Maximum	Mean	Biomass (tonnes)	Relative Error
Red urchin	1					
Redclaw crab	4					
Rock snails	1					
Sailfin sculpin	1					
Salp	2					
Salps	2					
Scorpionfishes	1					
Seaslugs	2					
Smooth alligatorfish	1					
Snailfishes	1					
Soft sculpin	3					
Spinyhead sculpin	1					
Spirontocaris	2					
True crabs	1					
Tubenose poacher	1					
Virgularia	1					
Whelks	1					
White sea cucumber	1					
Winged sea star	1					
Yellowleg shrimp	3					

Table 8. Number of samples and number of recorded biological attributes per species sampled.

Species	Number of Samples	Number of Recorded Biological Attributes				
		Length	Weight	Sex	Maturity	Age
Aleutian skate	2	2	2	2	0	0
Arrowtooth flounder	75	4,008	2,443	4,008	935	935
Big skate	19	46	36	46	0	0
Black rockfish	2	2	1	2	0	0
Blackbelly eelpout	3	94	0	0	0	0
Bocaccio	6	8	8	8	8	8
Buffalo sculpin	1	16	0	0	0	0
Butter sole	23	303	117	303	86	86
C-o sole	1	1	0	1	0	0
Canary rockfish	18	129	85	129	47	47
China rockfish	1	3	0	3	0	0
Chinook salmon	2	2	0	2	0	0
Copper rockfish	11	89	89	88	87	88
Curlfin sole	24	84	4	84	0	0
Darkblotched rockfish	5	5	1	5	0	0
Dover sole	50	1,843	921	1,843	549	550
English sole	56	2,454	1,123	2,455	423	423
Eulachon	37	2,055	0	90	0	0
Flathead sole	12	455	124	453	93	94
Greenstriped rockfish	1	14	0	14	0	0
Harlequin rockfish	3	3	0	3	0	0
Kelp greenling	17	106	4	106	0	0
Lingcod	62	358	325	358	118	118
Longfin smelt	1	57	0	0	0	0
Longnose skate	31	53	18	53	0	0
Pacific cod	100	1,196	1,137	1,183	1,003	388
Pacific hake	3	62	62	62	0	0
Pacific halibut	92	301	148	301	0	0
Pacific herring	18	931	0	0	0	0
Pacific ocean perch	19	509	173	499	106	106
Pacific sand lance	13	622	0	0	0	0
Pacific sanddab	15	613	173	613	103	103
Pacific sandfish	1	11	0	0	0	0
Pacific tomcod	8	391	99	391	0	0
Petrale sole	59	397	303	397	286	286
Pygmy rockfish	3	11	4	11	0	0
Quillback rockfish	28	248	248	248	247	247
Redbanded rockfish	42	298	263	298	257	257
Redstripe rockfish	2	94	40	94	40	40
Rex sole	53	2,349	1,012	2,349	472	450
Roughback sculpin	1	12	0	0	0	0
Rougheye rockfish	9	51	28	51	15	15
Sablefish	55	592	269	591	186	186
Sand sole	26	799	455	799	89	88
Sandpaper skate	13	16	2	15	0	0
Sharpchin rockfish	2	78	71	78	71	71
Shiner perch	1	30	0	0	0	0
Shortraker rockfish	1	1	1	1	1	1
Shortspine thornyhead	19	433	38	421	0	0
Silvergray rockfish	23	520	319	520	189	188
Slender sole	16	286	31	282	0	0
Slim sculpin	1	10	0	0	0	0
Snake prickleback	9	297	0	0	0	0
Southern rock sole	64	1799	1391	1799	921	921
Spiny dogfish	19	371	72	371	49	49
Spotted ratfish	50	2496	530	2496	0	0
Starry flounder	2	40	39	40	0	0
Sturgeon poacher	1	14	0	0	0	0
Tiger rockfish	1	1	0	1	0	0
Walleye pollock	29	957	235	947	34	34
Widow rockfish	6	15	0	15	0	0
Yelloweye rockfish	3	3	3	3	3	3
Yellowfin sole	2	78	0	78	0	0
Yellowtail rockfish	27	450	246	419	142	113
Total	**1,299**	**29,572**	**12,693**	**25,429**	**6,560**	**5,895**

Table 9. Numbers of samples and specimens by sample type and species.

Species	Total		Len./Sex		Len./Sex/Wt.		Len./Sex/Wt./Age	
	N	n	N	n	N	n	N	n
Aleutian skate	2	2	0	0	2	2	0	0
Arrowtooth flounder	75	4,008	29	1,564	27	1,506	19	935
Big skate	19	46	5	11	13	35	0	0
Black rockfish	2	2	1	1	1	1	0	0
Blackbelly eelpout	3	94	3	94	0	0	0	0
Bocaccio	6	8	0	0	0	0	6	8
Buffalo sculpin	1	16	1	16	0	0	0	0
Butter sole	23	303	18	186	3	31	2	86
C-o sole	1	1	1	1	0	0	0	0
Canary rockfish	18	129	15	44	2	38	1	47
China rockfish	1	3	1	3	0	0	0	0
Chinook salmon	2	2	2	2	0	0	0	0
Copper rockfish	11	89	0	0	1	1	9	87
Curlfin sole	24	84	22	80	2	4	0	0
Darkblotched rockfish	5	5	4	4	1	1	0	0
Dover sole	50	1,843	28	922	11	371	11	550
English sole	56	2,454	30	1,331	15	700	11	423
Eulachon	37	2,055	37	2,055	0	0	0	0
Flathead sole	12	455	9	331	1	30	2	94
Greenstriped rockfish	1	14	1	14	0	0	0	0
Harlequin rockfish	3	3	3	3	0	0	0	0
Kelp greenling	17	106	16	102	1	4	0	0
Lingcod	62	358	21	32	35	208	6	118
Longfin smelt	1	57	1	57	0	0	0	0
Longnose skate	31	53	17	35	14	18	0	0
Pacific cod	100	1,196	20	58	47	177	33	388
Pacific hake	3	62	0	0	3	62	0	0
Pacific halibut	92	301	53	153	39	148	0	0
Pacific herring	18	931	18	931	0	0	0	0
Pacific ocean perch	19	509	14	336	3	67	2	106
Pacific sand lance	13	622	13	622	0	0	0	0
Pacific sanddab	15	613	12	440	1	70	2	103
Pacific sandfish	1	11	1	11	0	0	0	0
Pacific tomcod	8	391	6	292	2	99	0	0
Petrale sole	59	397	37	94	9	17	13	286
Pygmy rockfish	3	11	2	7	1	4	0	0
Quillback rockfish	28	248	0	0	1	1	27	247
Redbanded rockfish	42	298	13	35	4	6	25	257
Redstripe rockfish	2	94	1	54	0	0	1	40
Rex sole	53	2,349	30	1,337	12	562	11	450
Roughback sculpin	1	12	1	12	0	0	0	0
Rougheye rockfish	9	51	3	23	5	13	1	15
Sablefish	55	592	39	323	12	83	4	186
Sand sole	26	799	13	344	11	365	2	88
Sandpaper skate	13	16	11	14	2	2	0	0
Sharpchin rockfish	2	78	1	7	0	0	1	71
Shiner perch	1	30	1	30	0	0	0	0
Shortraker rockfish	1	1	0	0	0	0	1	1
Shortspine thornyhead	19	433	17	395	2	38	0	0
Silvergray rockfish	23	520	15	201	3	130	5	188
Slender sole	16	286	14	255	2	31	0	0
Slim sculpin	1	10	1	10	0	0	0	0
Snake prickleback	9	297	9	297	0	0	0	0
Southern rock sole	64	1,799	23	408	13	470	28	921
Spiny dogfish	19	371	11	299	7	23	1	49
Spotted ratfish	50	2,496	39	1,966	11	530	0	0
Starry flounder	2	40	1	1	1	39	0	0
Sturgeon poacher	1	14	1	14	0	0	0	0
Tiger rockfish	1	1	1	1	0	0	0	0
Walleye pollock	29	957	24	722	4	201	1	34
Widow rockfish	6	15	6	15	0	0	0	0
Yelloweye rockfish	3	3	0	0	0	0	3	3
Yellowfin sole	2	78	2	78	0	0	0	0
Yellowtail rockfish	27	450	18	204	6	133	3	113
Total	**1,299**	**29,572**	**736**	**16,877**	**330**	**6,221**	**231**	**5,894**

Table 10. Statistics of individual length and weight, and sex proportion by species.

Species	Length (cm)			Weight (kg)			Sex Proportion	
	Min.	Max.	Mean	Min.	Max.	Mean	Male	Female
Aleutian skate	100	115	108	6.3	7.7	7.0	0.00	1.00
Arrowtooth flounder	11	72	41	0.0	3.2	0.8	0.39	0.61
Big skate	41	170	89	1.3	23.2	8.0	0.53	0.45
Black rockfish	22	45	33	0.2	0.2	0.2	1.00	0.00
Blackbelly eelpout	8	22	15				0.00	0.00
Bocaccio	66	75	70	3.0	5.4	4.3	0.88	0.13
Buffalo sculpin	10	15	11				0.00	0.00
Butter sole	15	41	29	0.0	0.7	0.3	0.46	0.54
C-o sole	24	24	24				1.00	0.00
Canary rockfish	26	57	45	0.3	3.0	1.6	0.57	0.43
China rockfish	25	31	29				1.00	0.00
Chinook salmon	38	48	43				0.00	1.00
Copper rockfish	11	46	34	0.0	1.9	0.8	0.62	0.37
Curlfin sole	16	41	30	0.5	0.7	0.6	0.42	0.58
Darkblotched rockfish	20	29	26	0.1	0.1	0.1	0.20	0.80
Dover sole	15	65	37	0.1	1.9	0.6	0.44	0.56
English sole	10	46	28	0.0	0.8	0.3	0.40	0.60
Eulachon	7	19	14				0.02	0.00
Flathead sole	8	41	30	0.0	0.4	0.2	0.54	0.46
Greenstriped rockfish	23	36	29				0.50	0.50
Harlequin rockfish	21	29	25				0.67	0.33
Kelp greenling	17	41	31	0.2	0.4	0.4	0.35	0.65
Lingcod	22	109	36	0.1	10.5	0.5	0.43	0.57
Longfin smelt	8	11	9				0.00	0.00
Longnose skate	11	138	89	1.0	12.4	4.5	0.42	0.58
Pacific cod	3	81	43	0.0	6.0	1.2	0.47	0.51
Pacific hake	46	67	53	0.7	1.6	1.0	0.26	0.74
Pacific halibut	20	165	73	0.1	56.4	6.0	0.62	0.38
Pacific herring	9	26	18				0.00	0.00
Pacific ocean perch	6	50	32	0.0	1.3	0.4	0.60	0.38
Pacific sand lance	9	42	12				0.00	0.00
Pacific sanddab	14	35	27	0.1	0.6	0.3	0.47	0.53
Pacific sandfish	16	19	17				0.00	0.00
Pacific tomcod	14	29	20	0.0	0.1	0.1	0.45	0.55
Petrale sole	20	61	36	0.1	3.0	0.7	0.44	0.56
Pygmy rockfish	15	23	18	0.0	0.1	0.1	0.18	0.82
Quillback rockfish	12	42	30	0.0	1.6	0.6	0.54	0.46
Redbanded rockfish	12	65	43	0.0	4.8	1.5	0.59	0.41
Redstripe rockfish	21	39	29	0.2	0.8	0.5	0.49	0.51
Rex sole	9	49	31	0.0	1.1	0.2	0.45	0.55
Roughback sculpin	11	18	13				0.00	0.00
Rougheye rockfish	11	46	29	0.0	1.5	0.4	0.49	0.51
Sablefish	29	93	39	0.3	3.5	0.6	0.53	0.47
Sand sole	8	46	24	0.0	1.2	0.2	0.47	0.53
Sandpaper skate	15	133	59	0.3	1.0	0.7	0.50	0.44
Sharpchin rockfish	16	27	21	0.0	0.3	0.1	0.67	0.33
Shiner perch	7	13	11				0.00	0.00
Shortraker rockfish	59	59	59	3.4	3.4	3.4	0.00	1.00
Shortspine thornyhead	6	49	27	0.0	1.7	0.4	0.44	0.53
Silvergray rockfish	18	64	49	0.1	3.4	1.7	0.79	0.21
Slender sole	14	35	25	0.1	0.2	0.1	0.27	0.71
Slim sculpin	12	23	18				0.00	0.00
Snake prickleback	6	37	20				0.00	0.00
Southern rock sole	7	51	28	0.0	1.8	0.4	0.37	0.63
Spiny dogfish	36	102	68	0.4	5.1	1.6	0.52	0.48
Spotted ratfish	8	52	32	0.0	1.6	0.4	0.52	0.48
Starry flounder	35	65	52	0.7	4.2	2.1	0.13	0.88
Sturgeon poacher	13	22	18				0.00	0.00
Tiger rockfish	41	41	41				1.00	0.00
Walleye pollock	4	70	39	0.0	2.3	1.0	0.42	0.57
Widow rockfish	10	57	44				0.33	0.67
Yelloweye rockfish	57	69	64	3.4	5.6	4.6	1.00	0.00
Yellowfin sole	8	18	12				0.45	0.55
Yellowtail rockfish	9	58	39	0.1	2.8	1.0	0.57	0.36

Table 11. Data collected from net sensors, showing the number of tows from which each data type was collected.

Sensor	Attribute	Number of Tows	Number of Records
Global Positioning System (GPS)	Vessel Position - Latitude	163	174,512
	Vessel Position - Longitude	163	174,512
	Vessel Direction - Compass Bearing True North	163	172,283
	Vessel Speed Over Ground	163	172,283
NMFS Bottom Contact Sensor	Bottom Contact Sensor Tilt Angle	160	51,727
Seabird SBE 19plus Seacat Profiler	Dissolved Oxygen	158	25,578
	Net Depth	158	25,578
	Salinity At Net Depth	158	25,578
	Water Temperature At Net Depth	158	25,578
Seabird SBE 39 Temperatue and Depth Sensor	Net Depth	158	33,227
	Water Temperature At Net Depth	158	33,227
Simrad ITI Trawl System	Net Depth	161	34,574
	Trawl Net Doorspread	77	1,997
	Trawl Net Footrope To Headline Distance (Opening)	151	3,169
	Water Temperature At Net Depth	144	3,447

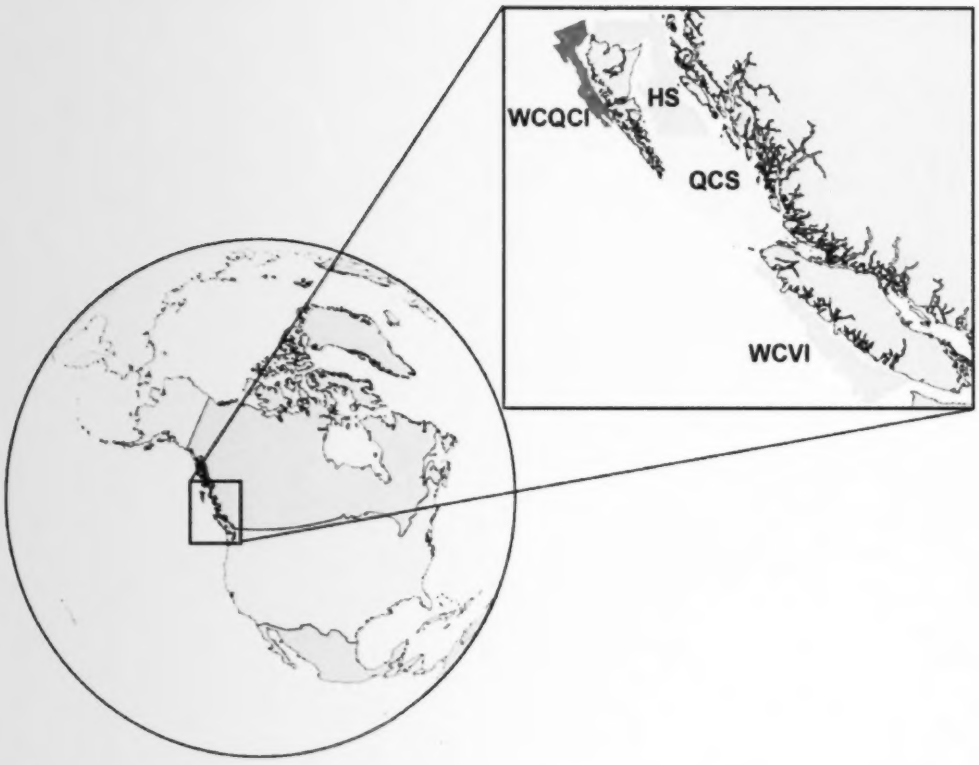

Figure 1. Locations of the modern groundfish trawl surveys on the coast of British Columbia, Canada. HS = Hecate Strait; WCQCI = west coast of Queen Charlotte Islands; QCS = Queen Charlotte Sound; WCVI = west coast of Vancouver Island.

Figure 2. The Canadian Coast Guard Ship W.E. Ricker.

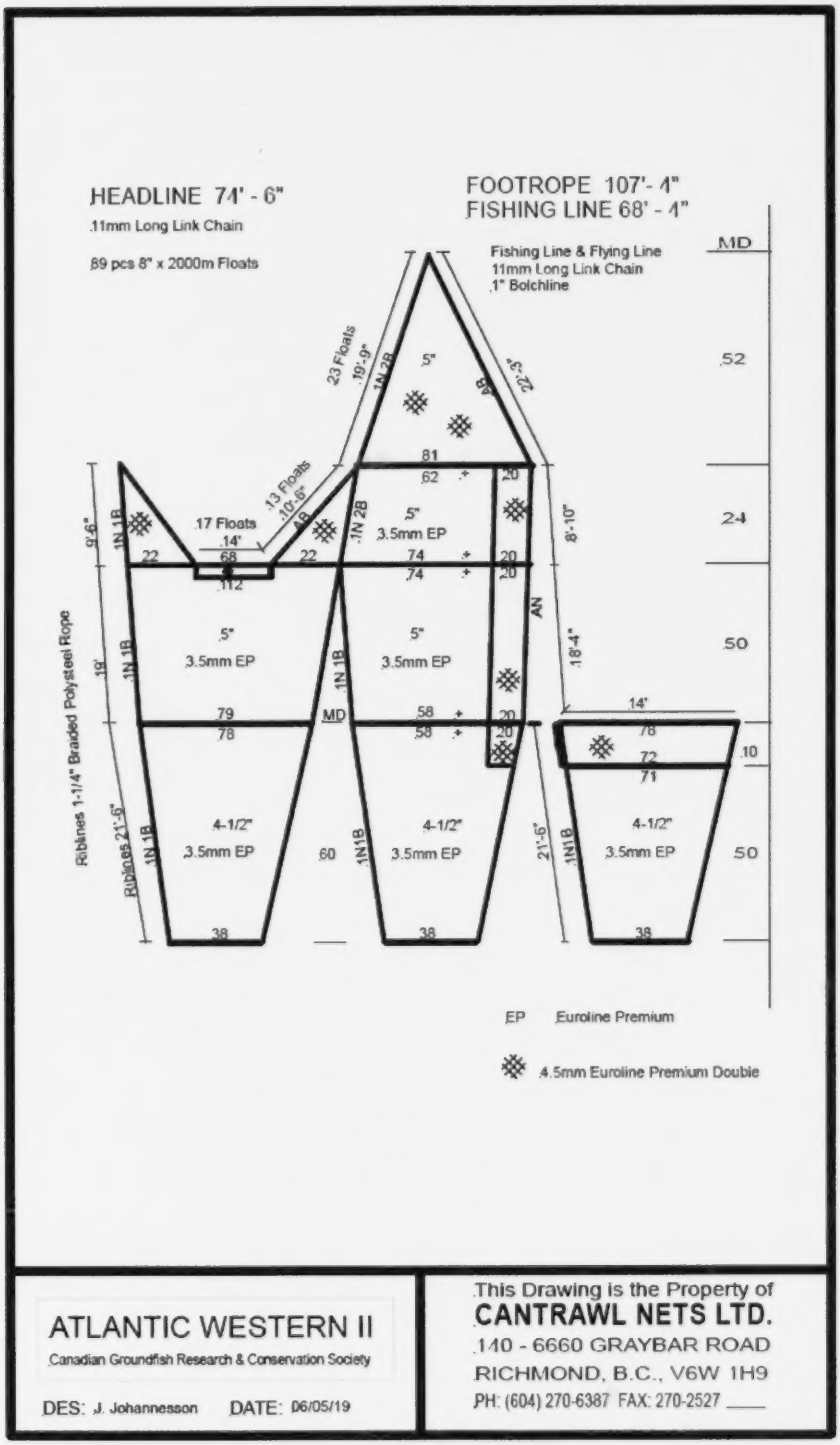

Figure 3. Design specifications for the Atlantic Western IIa box trawl used on the survey.

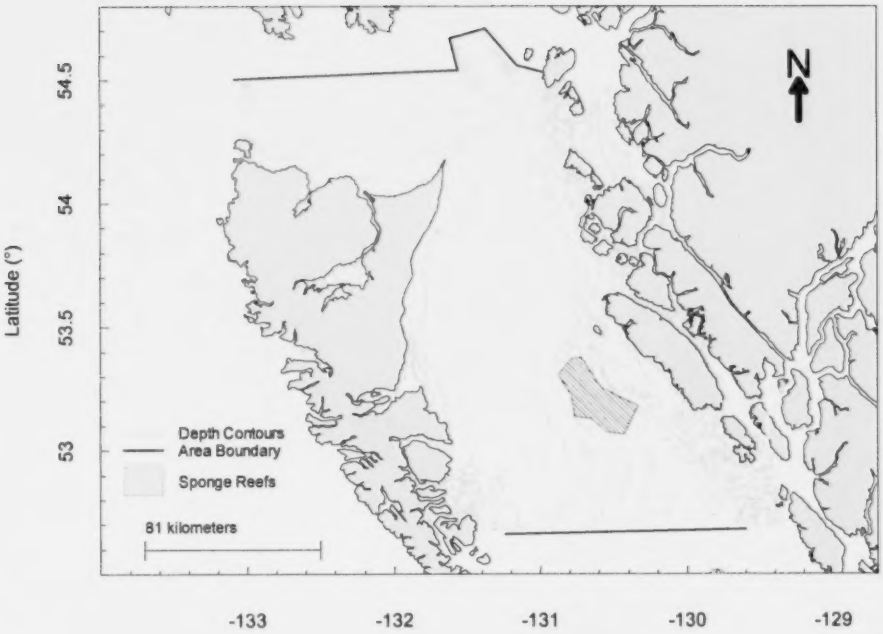

Figure 4. The Queen Charlotte Sound study area showing area boundary, sponge reef protected area, and depth contours.

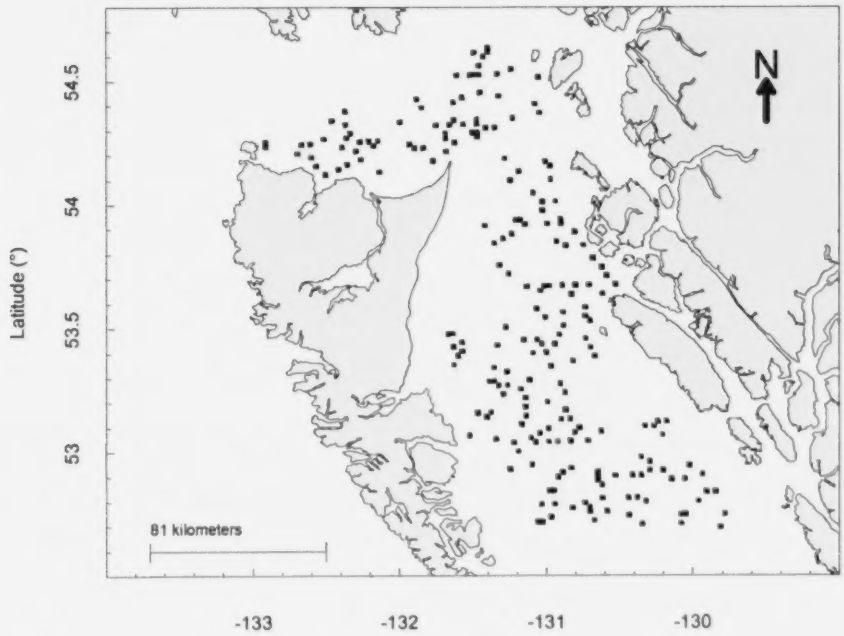

Figure 5. Initial status of the sampling frame showing the 121 selected fishing locations.

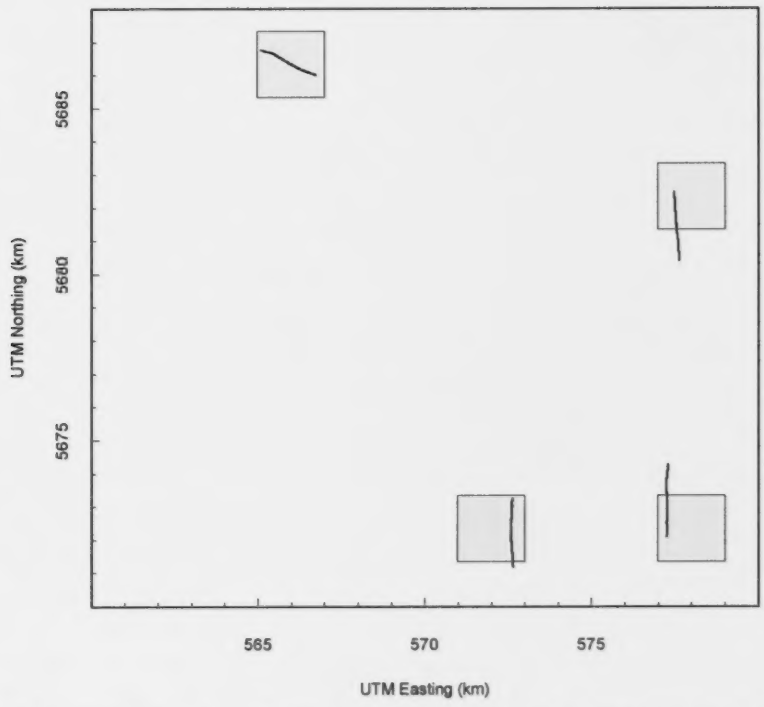

Figure 6. Example tow tracks demonstrating variations in track location within blocks.

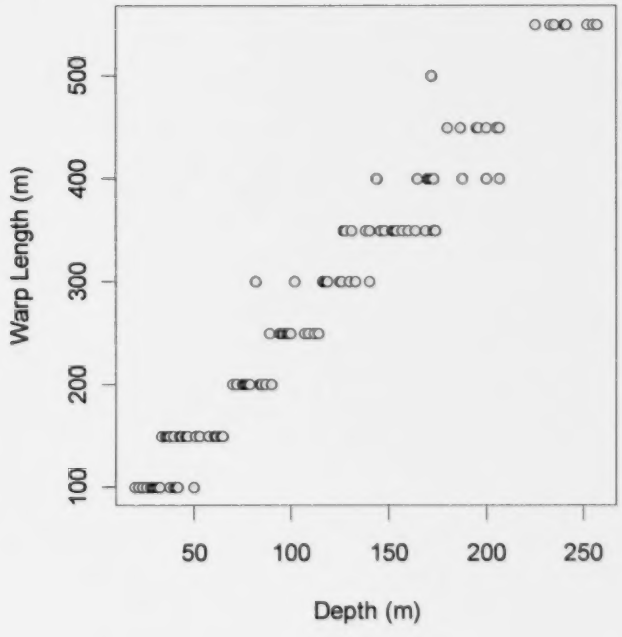

Figure 7. Warp length vs. starting depth.

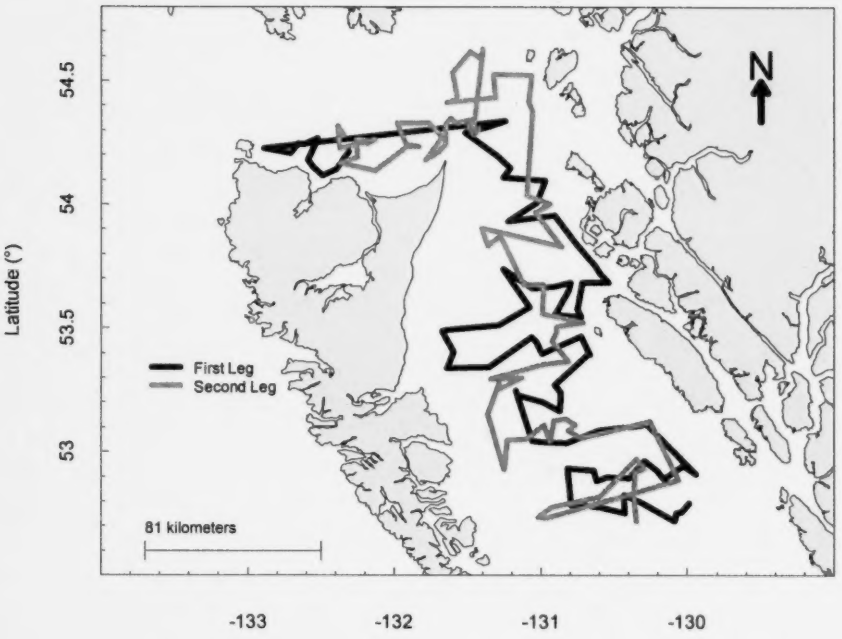

Figure 8. The paths followed on each leg of the survey.

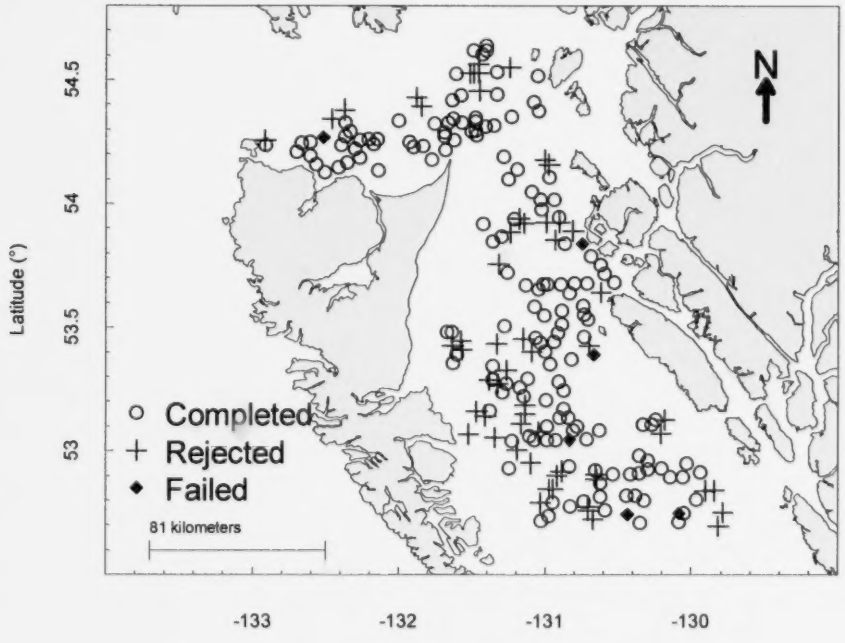

Figure 9. Final status of the sampling frame showing locations that were fished successfully (completed), rejected prior to fishing (rejected), or abandoned after one or more unsuccessful fishing attempts (failed).

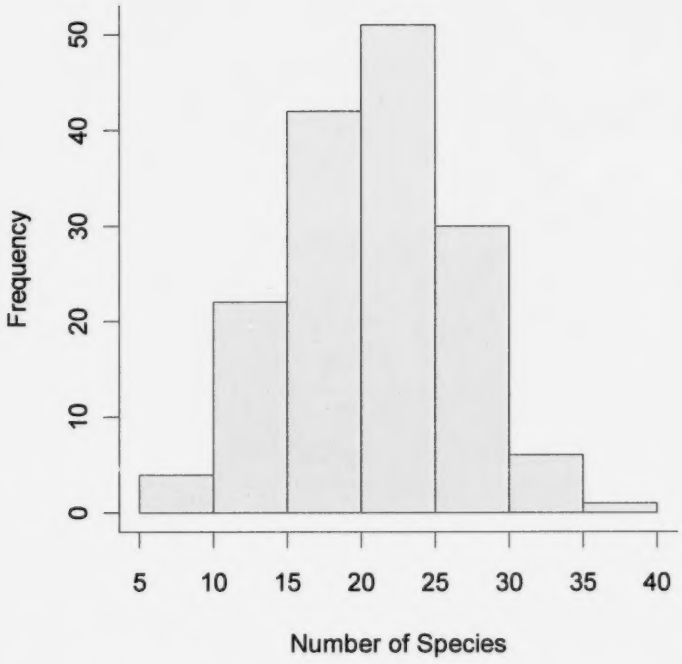

Figure 10. Histogram of number of species caught per tow.

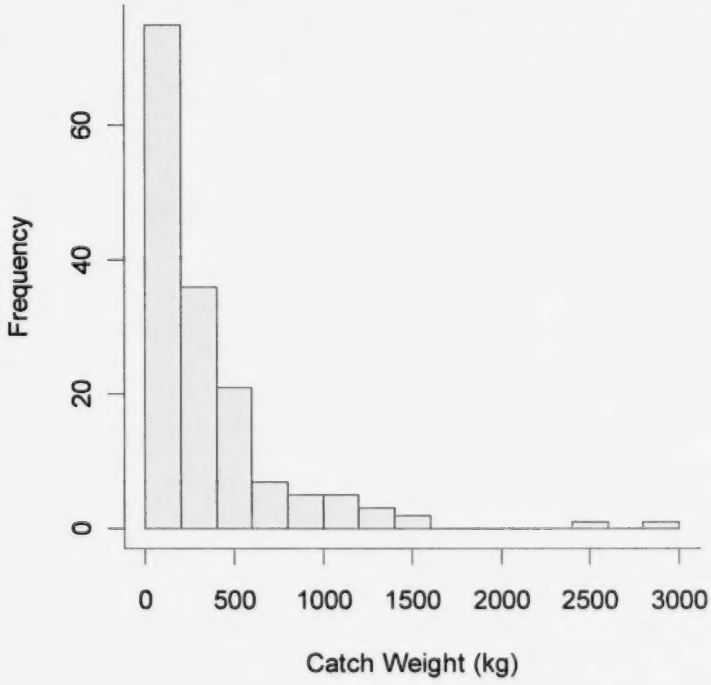

Figure 11. Histogram of catch weight per tow.

Species	2005	2007	2009
Arrowtooth flounder	16,391.4	7,848.4	12,871.0
Big skate	828.0	887.3	382.1
Bocaccio	20.7	53.0	16.8
Butter sole	74.8	230.0	157.9
Dover sole	4,187.3	3,505.2	2,073.7
English sole	2,998.1	3,181.4	2,772.8
Eulachon	45.4	26.9	100.9
Flathead sole	610.3	366.1	330.5
Greenstriped rockfish	7.8	6.3	10.8
Kelp greenling	43.7	58.5	64.5
Lingcod	205.1	267.1	243.7
Longnose skate	522.8	273.4	215.4
Pacific cod	2,062.7	676.7	2,465.1
Pacific halibut	2,215.6	1,197.9	1,698.6
Pacific herring	166.7	101.9	145.5
Pacific ocean perch	509.8	606.0	506.0
Pacific sanddab	677.3	1,262.9	499.7
Pacific tomcod	963.7	457.6	187.5
Petrale sole	173.8	296.9	227.6
Quillback rockfish	233.0	445.5	184.5
Redbanded rockfish	775.0	530.5	317.3
Rex sole	2,769.6	3,067.8	2,238.1
Roughback sculpin	2.0	0.9	3.6
Rougheye rockfish	296.0	310.3	39.9
Sand sole	573.8	399.7	545.2
Shortspine thornyhead	518.8	830.9	167.5
Silvergray rockfish	456.5	325.4	601.3
Slender sole	19.7	46.3	40.4
Snake prickleback	2.8	1.0	19.0
Southern rock sole	2,224.2	2,144.3	1,871.5
Spiny dogfish	4,286.5	1,491.6	1,008.1
Spotted ratfish	6,937.3	6,758.9	6,891.0
Sturgeon poacher	2.3	4.5	6.9
Walleye pollock	1,865.0	1,525.5	1,031.2

Figure 12. Biomass indices (tonnes) of selected species from all years of the Hecate Strait survey.

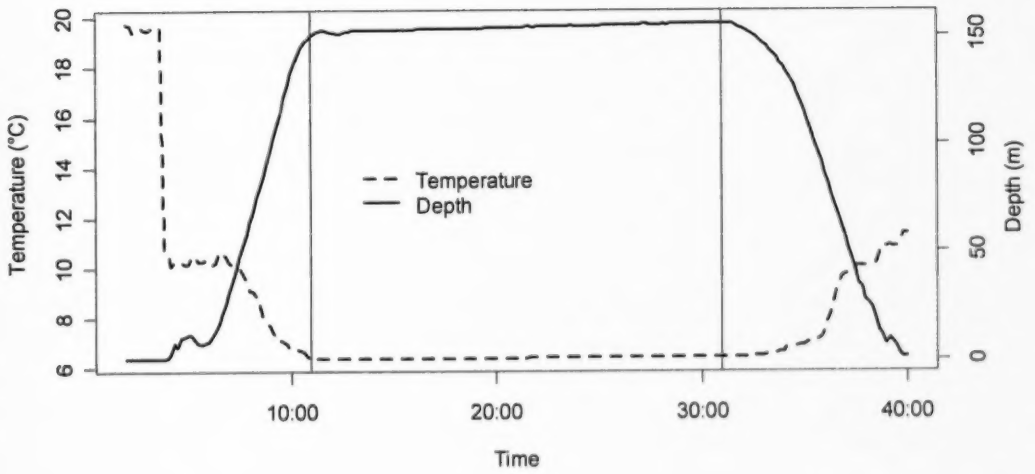

Figure 13. Example of a Seabird 39 temperature and depth profile. The vertical lines indicate the start and end of net contact with the sea floor.

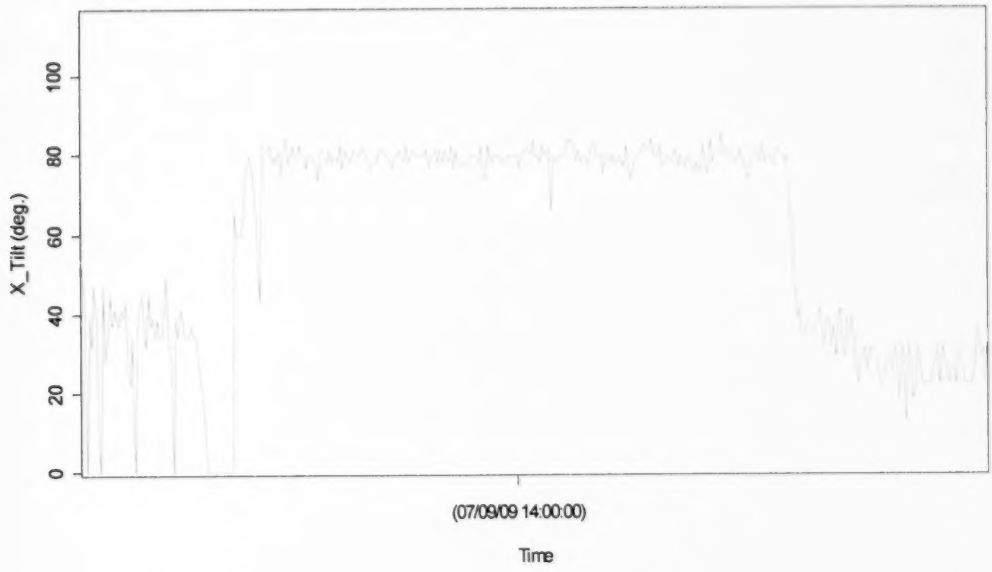

Figure 14. An example of an NMFS bottom contact sensor profile. The raised segment in the middle of the profile at approximately 80° indicates where the net made contact with the sea floor.

APPENDIX A: BRIDGE LOG

Tow	Date	Time	Latitude	Longitude	Depth (m)	Duration (min)	Speed (km/h)	Warp (m)	Catch (kg)	Usable?
1	May 28	07:35	52.7930	129.9928	257	19	5.4	550	112.6	Yes
2	May 28	08:44	52.7558	130.0410	255	19	5.3	550	105.3	Yes
3	May 28	09:47	52.7528	130.0792	241	20	5.3	550	146.8	No
4	May 28	11:07	52.7220	130.0893	103	16	5.7	500	120.6	Yes
5	May 28	12:45	52.7982	130.3150	162	19	5.3		75.5	Yes
6	May 28	13:50	52.8277	130.4317	131	19	5.5	350	30.9	Yes
7	May 28	14:51	52.7537	130.4300	138	20	5.3	350	21.2	No
8	May 28	17:39	52.7757	130.5953	127	19	5.2	350	399.3	Yes
9	May 29	07:19	52.7895	130.7613	84	19	5.2	200	56.3	Yes
10	May 29	08:28	52.7862	130.7952	76	20	5.8		153.4	Yes
11	May 30	07:10	52.9333	130.8170	44	20	5.7	150	92.4	Yes
12	May 30	08:22	52.9273	130.6428	75	15	5.3	200	93.0	Yes
13	May 30	09:03	52.8840	130.6185	89	20	5.5	250	92.8	Yes
14	May 30	09:59	52.8972	130.5442	102	19	5.5	300	107.5	Yes
15	May 30	11:08	52.8958	130.4002	140	19	5.2	300	258.1	Yes
16	May 30	12:47	52.9650	130.2965	205	19	5	450	196.3	Yes
17	May 30	13:46	52.9245	130.2093	225	19	5.5	550	196.1	Yes
18	May 30	14:47	52.8907	130.1608	233	19	5.8	550	221.3	Yes
19	May 30	16:17	52.9458	130.0318	240	19	5.4	550	271.7	Yes
20	May 30	17:53	52.9095	129.9453	172	19	5.2	500	108.8	Yes
21	May 31	07:22	53.1183	130.2863	200	19	5.7	450	432.5	Yes
22	May 31	08:17	53.1068	130.3162	180	19	5.2	450	164.6	Yes
23	May 31	10:04	53.0888	130.6083	138	19	5.6	350	305.3	Yes
24	May 31	11:50	53.0352	130.8262	77	12	5.4	200	59.5	No
25	May 31	13:32	53.0383	130.9732	34	20	5.7	150	121.6	Yes
26	May 31	14:54	53.0427	131.0605	30	19	5.8	100	23.9	Yes
27	May 31	17:32	53.2487	131.1690	36	19	6.1	150	194.3	Yes
28	May 31	18:25	53.2300	131.1557	40	20	5.8	150	116.2	Yes
29	Jun 1	07:14	53.2025	130.9837	78	19	5.7	200	162.8	Yes
30	Jun 1	08:28	53.1653	130.8748	100	19	5.6	250	134.2	Yes
31	Jun 1	09:22	53.2390	130.8650	116	19	6	300	290.1	Yes
32	Jun 1	10:11	53.2715	130.9073	96	19	5.8	250	196.0	Yes
33	Jun 1	12:04	53.3962	130.6782	117	4	6.6	300	16.8	No
34	Jun 1	12:44	53.3945	130.6688	117	7	6.1	300	32.3	No
35	Jun 1	14:28	53.4673	130.7245	82	19	5.5	300	356.7	Yes
36	Jun 1	16:12	53.3988	130.9910	87	19	5.2	200	156.4	Yes
37	Jun 1	17:44	53.4457	131.0328	50	19	5.3	100	306.3	Yes
38	Jun 1	18:31	53.4635	131.0685	42	19	5.8	100	171.1	Yes
39	Jun 2	07:17	53.3430	131.3590	32	19	5.6	100	165.3	Yes
40	Jun 2	09:03	53.3405	131.6408	28	19	5.6	100	198.1	Yes
41	Jun 2	10:05	53.4065	131.5955	29	19	5.6	100	93.3	Yes
42	Jun 2	11:58	53.4875	131.6760	24	20	5.6	100	84.7	Yes
43	Jun 2	13:19	53.4918	131.6513	28	19	5.6	100	125.4	Yes

Appendix A continued.

Tow	Date	Time	Latitude	Longitude	Depth (m)	Duration (min)	Speed (km/h)	Warp (m)	Catch (kg)	Usable?
44	Jun 2	15:26	53.5138	131.2897	28	19	5.9	100	125.3	Yes
45	Jun 2	18:17	53.5872	131.0818	40	19	5.5	100	127.3	Yes
46	Jun 3	07:04	53.7390	131.2553	38	19	5.8	100	496.0	Yes
47	Jun 3	08:20	53.6618	131.0602	51	19	5.8	150	272.3	Yes
48	Jun 3	09:25	53.6713	130.9065	44	19	5.5	150	141.7	Yes
49	Jun 3	10:18	53.6840	130.7967	53	19	5.5	150	332.2	Yes
50	Jun 3	10:01	53.6545	130.8102	53	18	5.6	150	232.1	Yes
51	Jun 3	12:14	53.5558	130.9027	65	19	5.6	150	142.8	Yes
52	Jun 3	13:31	53.5493	130.7240	144	19	5.5	400	703.6	Yes
53	Jun 3	14:39	53.5793	130.7560	154	19	5.5	350	1,439.5	Yes
54	Jun 3	15:59	53.6855	130.7222	130	19	5.5	300	488.2	Yes
55	Jun 3	17:31	53.6867	130.5412	46	20	5.4	150	517.4	Yes
56	Jun 3	18:34	53.7202	130.5930	64	20	5.3	150	284.8	Yes
57	Jun 4	07:17	53.7557	130.6328	98	19	5.4	250	139.9	Yes
58	Jun 4	08:27	53.7895	130.6785	100	19	5.5	250	278.7	Yes
59	Jun 4	09:45	53.8432	130.7623	61	11	5	150	125.4	No
60	Jun 4	11:50	53.9565	130.9063	61	17	5.7	150	1,517.0	Yes
61	Jun 4	14:52	53.9313	131.2260	32	15	5.6	100	301.1	Yes
62	Jun 4	17:44	54.0065	131.0340	78	19	5.7	200	497.4	Yes
63	Jun 5	07:37	54.0983	130.9752	72	19	5.5	200	234.5	Yes
64	Jun 5	09:59	54.1115	131.2597	30	19	5.7	100	74.6	Yes
65	Jun 5	11:51	54.1478	131.2088	30	20	5.8	100	152.1	Yes
66	Jun 5	13:06	54.1982	131.2998	28	19	5.6	100	539.2	Yes
67	Jun 5	14:55	54.2898	131.5157	128	19	5.5	350	969.1	Yes
68	Jun 5	15:55	54.3140	131.3662	119	19	5.5	300	616.2	Yes
69	Jun 5	16:50	54.3397	131.2437	84	17	6	200	2,995.4	Yes
70	Jun 6	07:06	54.2265	132.8883	160	19	5.6	350	1,330.0	Yes
71	Jun 6	08:32	54.2098	132.7107	157	20	5.6	350	509.8	Yes
72	Jun 6	09:41	54.2493	132.6562	169	20	5.5	350	10.5	Yes
73	Jun 6	10:35	54.2422	132.6168	140	19	5.2	350	564.4	Yes
74	Jun 6	12:06	54.2665	132.5260	154	3	5.9	350	0.0	No
75	Jun 6	16:20	54.1828	132.5893	94	19	5.5	250	132.6	Yes
76	Jun 6	17:39	54.1517	132.5565	72	19	5.8	200	1,207.1	Yes
77	Jun 7	07:18	54.1193	132.4958	41	20	5.9	100	132.2	Yes
78	Jun 7	08:22	54.1408	132.4013	77	19	5.6	200	423.1	Yes
79	Jun 7	09:37	54.2167	132.3122	126	19	5.7	300	382.2	Yes
80	Jun 9	07:29	54.2735	132.3845	188	19	5.6	400	102.8	Yes
81	Jun 9	08:21	54.2842	132.3473	195	19	5.7	450	142.7	Yes
82	Jun 9	09:31	54.3183	132.3833	207	22	5.8	450	120.3	Yes
83	Jun 9	10:59	54.2283	132.3747	133	19	5.5	300	318.2	Yes
84	Jun 9	13:09	54.2655	132.1367	164	19	5.5	350	118.0	Yes
85	Jun 9	14:03	54.2467	132.1902	146	19	5.6	350	399.0	Yes
86	Jun 9	14:56	54.2642	132.2047	173	21	5.8	350	186.9	Yes

Appendix A continued.

Tow	Date	Time	Latitude	Longitude	Depth (m)	Duration (min)	Speed (km/h)	Warp (m)	Catch (kg)	Usable?
87	Jun 9	15:49	54.2620	132.2625	174	19	5.8	350	110.7	Yes
88	Jun 9	17:35	54.1923	132.2555	107	19	5.6	250	389.9	Yes
89	Jun 9	18:36	54.1703	132.3678	96	19	5.4	250	534.0	Yes
90	Jun 10	07:19	54.1390	132.1328	33	19	6	100	130.5	Yes
91	Jun 10	08:58	54.2345	131.9120	148	19	5.9	350	215.5	Yes
92	Jun 10	09:45	54.2348	131.8385	157	13	5.7	350	385.4	Yes
93	Jun 10	10:45	54.2447	131.9187	170	19	5.8	400	324.1	Yes
94	Jun 10	12:26	54.3300	131.9787	235	19	5.7	550	219.3	Yes
95	Jun 10	14:52	54.3292	131.7640	196	21	5.9	450	227.9	Yes
96	Jun 10	15:51	54.2882	131.6978	212	19	5.9	350	533.1	Yes
97	Jun 10	16:44	54.2747	131.6753	140	19	6	350	489.1	Yes
98	Jun 10	18:14	54.1800	131.7892	62	19	5.8	150	508.8	Yes
99	Jun 11	07:14	54.2137	131.7002	70	19	6.1	200	1,120.3	Yes
100	Jun 11	08:05	54.2465	131.6490	99	19	6	250	902.8	Yes
101	Jun 11	09:07	54.3247	131.6492	171	19	5.8	400	316.8	Yes
102	Jun 11	10:18	54.3508	131.6182	171	19	5.6	400	207.8	Yes
103	Jun 11	11:49	54.3293	131.5782	173	19	6	400	768.3	Yes
104	Jun 11	12:54	54.3475	131.4595	187	19	5.9	450	424.8	Yes
105	Jun 11	13:47	54.3245	131.4942	165	19	5.8	400	620.3	Yes
106	Jun 11	14:44	54.2823	131.4558	64	19	5.6	150	937.1	Yes
107	Jun 11	15:36	54.3063	131.4265	118	20	5.7	150	852.8	Yes
108	Jun 11	16:40	54.2920	131.4633	96	19	5.5	250	1,315.8	Yes
109	Jun 12	07:10	54.6297	131.3955	64	20	5.6	350	599.9	Yes
110	Jun 12	08:02	54.6233	131.3980	140	19	5.7	350	508.5	Yes
111	Jun 12	08:52	54.5925	131.4168	119	19	5.7	300	502.9	Yes
112	Jun 12	09:51	54.6192	131.4868	131	19	5.6	350	379.7	Yes
113	Jun 12	11:50	54.5337	131.6058	149	19	6.1		364.8	Yes
114	Jun 12	13:36	54.4262	131.5668	154	19	6		148.5	Yes
115	Jun 12	14:47	54.4140	131.6415	175	19	6		161.4	Yes
116	Jun 12	16:58	54.4325	131.3100	172	19	5.6	400	357.5	Yes
117	Jun 13	07:22	54.5268	131.3215	112	19	5.7	250	1,125.4	Yes
118	Jun 13	09:06	54.5230	131.0630	153	19	5.8	350	480.0	Yes
119	Jun 13	10:13	54.4177	131.0878	118	20	6	300	776.5	Yes
120	Jun 13	11:05	54.3808	131.0603	76	19	5.8	200	836.1	Yes
121	Jun 13	13:37	54.0375	131.1015	20	19	5.7	100	29.7	Yes
122	Jun 13	14:58	54.0045	130.9417	78	19	5.8	200	1,108.1	Yes
123	Jun 13	16:10	53.9680	131.0360	77	19	6	200	2,520.6	Yes
124	Jun 13	18:05	53.8318	130.8590	79	19	5.8	200	643.1	Yes
125	Jun 14	07:21	53.9048	131.4068	22	17	5.8	100	189.2	Yes
126	Jun 14	08:34	53.8353	131.3657	22	19	5.5	100	355.6	Yes
127	Jun 14	09:54	53.8730	131.2777	22	16	6.2	100	180.9	Yes
128	Jun 14	12:09	53.6767	131.1200	44	19	6.1	150	696.0	Yes
129	Jun 14	13:35	53.6788	131.0078	37	19	5.9	150	508.7	Yes
130	Jun 14	14:22	53.6793	130.9848	38	19	5.9	150	149.1	Yes

Appendix A continued.

Tow	Date	Time	Latitude	Longitude	Depth (m)	Duration (min)	Speed (km/h)	Warp (m)	Catch (kg)	Usable?
131	Jun 14	16:12	53.5588	130.9925	46	16	6.2	150	84.0	Yes
132	Jun 14	17:57	53.5228	130.7108	258	19	6	400	1,059.0	Yes
133	Jun 15	07:10	53.5100	130.8903	87	19	6.1	200	182.7	Yes
134	Jun 15	08:03	53.4823	130.8995	95	19	5.9	250	170.3	Yes
135	Jun 15	08:49	53.4495	130.9288	98	19	5.7	250	255.1	Yes
136	Jun 15	10:10	53.3673	130.8107	152	18	5.9	350	572.2	Yes
137	Jun 15	11:52	53.3558	130.9785	85	19	5.7	200	178.7	Yes
138	Jun 15	16:54	53.2977	131.3440	26	19	6.2	100	87.0	Yes
139	Jun 15	18:32	53.3005	131.1295	42	19	5.8	100	233.7	Yes
140	Jun 16	07:15	53.2512	131.2937	31	19	5.8	100	63.8	Yes
141	Jun 16	08:13	53.2832	131.2823	31	19	5.9	100	168.8	Yes
142	Jun 16	09:42	53.1532	131.3672	28	19	6.1	100	16.8	Yes
143	Jun 16	13:16	52.9302	131.2497	90	19	6.1	200	1,072.9	Yes
144	Jun 16	15:01	53.0472	131.2335	29	19	6.2	100	134.1	Yes
145	Jun 16	15:57	53.0508	131.1067	30	19	6.5	100	205.6	Yes
146	Jun 16	17:32	53.1102	130.9795	58	19	5.9	150	36.3	Yes
147	Jun 16	18:24	53.0453	130.9358	30	14	5.9	100	134.9	Yes
148	Jun 17	07:11	53.1273	130.9107	84	19	5.8	200	92.4	Yes
149	Jun 17	08:20	53.1343	130.8307	114	19	5.9	250	97.0	Yes
150	Jun 17	09:17	53.1105	130.7667	125	19	6	300	296.4	Yes
151	Jun 17	10:12	53.0875	130.8133	117	19	6.1	300	424.9	Yes
152	Jun 17	11:00	53.0548	130.7247	118	19	6.1	300	279.1	Yes
153	Jun 17	13:59	53.1237	130.2520	200	15	5.7	400	53.9	Yes
154	Jun 17	16:41	52.8860	130.0658	252	19	6.1	550	121.5	Yes
155	39982	0.299	52.7337	130.9595	51	19	6.1	150	100.72	Yes
156	39982	0.351	52.7378	131.0193	43	19	6	150	37.47	Yes
157	Jun 18	09:22	52.7767	130.9330	47	17	5.8	150	114.1	Yes
158	Jun 18	11:50	52.8217	130.6037	109	19	6.2	250	72.4	Yes
159	Jun 18	13:42	52.9718	130.3510	188	19	5.9	400	149.8	Yes
160	Jun 18	14:44	52.9347	130.2925	207	19	6.1	400	135.9	Yes
161	Jun 18	15:45	52.9185	130.3632	173	19	6	400	183.8	Yes
162	Jun 18	16:46	52.8272	130.3712	172	19	5.8	400	190.2	Yes
163	Jun 18	18:07	52.7198	130.3458	195	19	5.7	450	310.3	Yes

APPENDIX B: CATCH BY TOW

Species	1	2	3	4	5	6	7	8	9	10
Aleutian skate		7.67								
Arrowtooth flounder	70.86	35.62	36.46	75.38	47.24	3.72	3.33	4.42	1.31	3.58
Big skate										
Bigmouth sculpin										
Blackbelly eelpout				0.04		0.03				
Bocaccio										
Butter sole										
Canary rockfish						2.47		41.86	7.75	
Copper rockfish										
Curlfin sole									1.28	2.66
Dover sole	16.90	20.21	11.33	7.08	12.76	0.82		1.52		
English sole								6.32	1.24	2.55
Eulachon	2.46	0.80	0.98	1.38	0.88	0.12				
Flathead sole	0.40							0.38		
Greenstriped rockfish						1.87	0.97			
Kelp greenling										
Lingcod						4.54		3.60	2.93	3.28
Longnose skate	5.54	0.96		8.74						
Pacific cod						0.62	1.01	1.76		7.98
Pacific hake										
Pacific halibut				5.72					6.95	11.54
Pacific ocean perch	0.52	3.27	9.63	2.06	0.12	0.11		0.38		
Pacific sand lance										
Pacific sanddab									4.36	10.42
Pacific staghorn sculpin										
Pacific tomcod										
Petrale sole		0.75	3.30	0.36		0.45		0.34	3.08	22.76
Quillback rockfish						0.43		1.08		
Redbanded rockfish	2.82	3.74	23.42	2.60	3.44					
Redstripe rockfish						0.71	2.27			
Rex sole	5.20	5.25	2.00	1.54	2.34	2.90	2.33	280.23	2.89	1.68
Rougheye rockfish	0.52	1.01	4.12	0.50						
Sablefish			6.66		1.70					
Sand sole										
Sandpaper skate			3.36			1.01				
Sharpchin rockfish			0.42			0.12	0.04	0.14		
Shortspine thornyhead	0.88	1.36	11.29	3.04						
Silvergray rockfish					1.92	4.81	4.22	39.34	4.98	
Slender sole	1.64	1.04	0.39		0.28			0.40		
Snake prickleback									0.02	
Southern rock sole									4.67	40.65
Spiny dogfish	1.22	11.33	0.94	4.00	0.82			6.18	1.35	
Spotted ratfish	0.72	3.84	4.95	1.32	2.30	4.86	1.46	11.12	11.69	34.40
Starry flounder										
Sturgeon poacher										0.16
Walleye pollock			0.64		0.24	0.23	0.17			
Wattled eelpout										
Widow rockfish										
Yelloweye rockfish							3.72			
Yellowtail rockfish			1.71							
Other	2.92	8.42	25.15	6.88	1.46	1.11	1.71	0.20	1.84	11.70
Total	**112.60**	**105.27**	**146.75**	**120.64**	**75.50**	**30.93**	**21.23**	**399.27**	**56.34**	**153.36**

Appendix B continued.

Species	11	12	13	14	15	16	17	18	19	20
Aleutian skate								6.31		
Arrowtooth flounder	0.38	5.59	2.96	4.88	33.94	78.65	77.92	54.75	134.20	37.04
Big skate	14.26									
Bigmouth sculpin										
Blackbelly eelpout										
Bocaccio										
Butter sole	1.59	2.08								
Canary rockfish					1.61					
Copper rockfish										
Curlfin sole	1.53	2.01								
Dover sole	0.29		0.26	0.86	2.61	19.76	36.27	21.27	60.96	10.00
English sole	27.09	10.36	17.30	9.25	5.45					
Eulachon					1.75	1.46	2.34	2.04	2.56	4.07
Flathead sole			0.32	0.16	1.25	0.38	0.80	0.68		4.94
Greenstriped rockfish				3.16						
Kelp greenling										
Lingcod		3.95		2.58				6.32		6.18
Longnose skate						11.98	12.42			1.97
Pacific cod			0.40	2.44						
Pacific hake										3.35
Pacific halibut				15.44			4.38		11.76	
Pacific ocean perch					0.16	0.70	3.54	102.67	7.28	4.15
Pacific sand lance	0.18									
Pacific sanddab	0.34	12.53	1.36							
Pacific staghorn sculpin										
Pacific tomcod										
Petrale sole		3.32	1.22	1.03	18.82	2.18		1.58		
Quillback rockfish			4.06	19.23						
Redbanded rockfish						39.76	27.23	4.20	17.36	19.15
Redstripe rockfish				19.06	1.68					
Rex sole		1.95	49.22	17.15	175.35	4.30	2.18	1.68	3.20	1.83
Rougheye rockfish						0.58	2.44	0.90	1.68	
Sablefish					2.55	0.44		1.24		
Sand sole	3.73									
Sandpaper skate						1.00				
Sharpchin rockfish							0.30			0.20
Shortspine thornyhead						0.28	0.88	2.44	2.08	1.66
Silvergray rockfish				0.70	6.52	4.46			2.64	0.87
Slender sole			0.12	0.10		0.32	1.46	2.44	2.62	2.21
Snake prickleback										
Southern rock sole	39.30	33.26								
Spiny dogfish	2.57		5.30	6.62		18.64	12.28	6.82	3.26	3.20
Spotted ratfish	0.67	17.77	9.18	3.77	3.41	1.78	2.90	2.06	2.24	1.26
Starry flounder										
Sturgeon poacher	0.38	0.14								
Walleye pollock					0.47				0.92	
Wattled eelpout										
Widow rockfish			0.12							
Yelloweye rockfish										
Yellowtail rockfish					1.86	3.50			5.07	1.83
Other	0.05		0.96	0.97	0.64	6.12	8.71	3.86	13.83	4.84
Total	**92.36**	**92.96**	**92.78**	**107.46**	**258.07**	**196.29**	**196.05**	**221.26**	**271.66**	**108.75**

Appendix B continued.

Species	21	22	23	24	25	26	27	28	29	30
Aleutian skate										
Arrowtooth flounder	286.46	102.60	49.68	1.12	0.05		1.84		6.86	67.26
Big skate					2.39			11.38		
Bigmouth sculpin										
Blackbelly eelpout										
Bocaccio										
Butter sole							0.12			
Canary rockfish				0.23	0.84					
Copper rockfish				1.32						
Curlfin sole					0.77	0.53	12.45	3.92	0.40	
Dover sole	78.04	26.76	3.90						1.54	1.34
English sole			25.80	3.21	3.95	0.26	24.40	1.47	21.20	11.70
Eulachon	0.90	1.38	0.60							
Flathead sole	18.46	3.13	11.28	0.63						0.38
Greenstriped rockfish										
Kelp greenling				0.62						
Lingcod				9.23			0.46	0.66		4.20
Longnose skate	10.12	7.12								
Pacific cod								2.46	1.67	3.44
Pacific hake	2.50	2.81								
Pacific halibut						3.17	65.42	15.78	18.06	
Pacific ocean perch	0.36	1.24	0.66							0.06
Pacific sand lance					0.23	0.14	0.03	0.94		
Pacific sanddab				0.14			0.24		52.34	
Pacific staghorn sculpin										
Pacific tomcod							0.07	0.34	1.51	
Petrale sole			4.14	0.76					17.16	8.72
Quillback rockfish				11.39	2.03					
Redbanded rockfish	5.50	4.30								
Redstripe rockfish				1.47	0.50					
Rex sole	3.58	3.73	182.22	7.02					1.89	11.12
Rougheye rockfish		1.50								
Sablefish	1.30	2.36	14.40							0.92
Sand sole					9.80	6.97	6.82	0.44		
Sandpaper skate										
Sharpchin rockfish										
Shortspine thornyhead	1.68									
Silvergray rockfish					0.85					
Slender sole	0.74	0.14	0.26							
Snake prickleback							0.02	0.01		
Southern rock sole					5.46	10.78	65.24	66.68	1.28	
Spiny dogfish	14.64		6.08	0.68			5.78	6.48	14.80	9.88
Spotted ratfish	2.30	3.72	3.98	3.06	88.72	0.96	4.46	3.98	23.42	12.04
Starry flounder										
Sturgeon poacher					0.05	0.04	0.17	0.32	0.14	
Walleye pollock							0.17			2.90
Wattled eelpout										
Widow rockfish				0.24						
Yelloweye rockfish					5.63					
Yellowtail rockfish			1.72							
Other	5.94	3.83	0.61	18.41	0.35	1.04	6.61	1.35	0.57	0.28
Total	**432.52**	**164.62**	**305.33**	**59.53**	**121.62**	**23.89**	**194.30**	**116.21**	**162.84**	**134.24**

Appendix B continued.

Species	31	32	33	34	35	36	37	38	39	40
Aleutian skate										
Arrowtooth flounder	154.65	118.39	6.24	13.41	239.58	30.62	3.52			
Big skate										19.01
Bigmouth sculpin				2.90						
Blackbelly eelpout										
Bocaccio										
Butter sole									0.66	0.36
Canary rockfish								0.50		
Copper rockfish							13.60	26.60	1.20	
Curlfin sole							1.28		1.76	
Dover sole	10.07	0.18		2.72	12.64	10.74	0.42			
English sole	5.09	0.38			48.98	7.48			8.78	6.52
Eulachon	0.22									
Flathead sole	15.20	0.36		0.92	8.76	34.78	1.52			
Greenstriped rockfish		2.24								
Kelp greenling							4.76	12.08		
Lingcod		7.66			2.14		4.18	5.48	0.18	
Longnose skate		4.92								
Pacific cod	4.18			2.80	7.39		9.70			
Pacific hake										
Pacific halibut						4.58	29.70	2.98	16.60	79.86
Pacific ocean perch		0.32	0.16							
Pacific sand lance										
Pacific sanddab										
Pacific staghorn sculpin										
Pacific tomcod						2.80			0.30	
Petrale sole	0.20	2.26				0.38				
Quillback rockfish		15.04	2.98				37.06	27.12	1.52	
Redbanded rockfish										
Redstripe rockfish		2.16								
Rex sole	71.03	1.12	0.25	1.21	21.92	46.98		0.36		
Rougheye rockfish										
Sablefish	3.62	1.98		0.49	3.90	1.86				
Sand sole									28.44	26.96
Sandpaper skate										
Sharpchin rockfish		0.02								
Shortspine thornyhead										
Silvergray rockfish		2.20			1.08					
Slender sole	0.48		0.13			0.22			0.08	
Snake prickleback										2.18
Southern rock sole							15.04	1.00	56.54	28.16
Spiny dogfish	22.60	21.38	5.12			11.34			1.42	3.05
Spotted ratfish	0.98	7.84	1.26	7.11	7.36	3.54	148.47	73.79	9.12	
Starry flounder										
Sturgeon poacher		0.05							0.18	
Walleye pollock	0.08	0.94	0.05	0.31	1.97				0.24	
Wattled eelpout										
Widow rockfish				0.08						
Yelloweye rockfish		3.38								
Yellowtail rockfish							27.82			
Other	1.74	3.22	0.61	0.34	0.96	1.04	9.18	21.21	38.30	32.04
Total	**290.14**	**196.04**	**16.80**	**32.29**	**356.68**	**156.36**	**306.25**	**171.12**	**165.32**	**198.14**

Appendix B continued.

Species	41	42	43	44	45	46	47	48	49	50
Aleutian skate										
Arrowtooth flounder						2.66		1.56	133.14	30.04
Big skate	4.57	25.20	42.60			27.82	13.22	13.70		
Bigmouth sculpin										
Blackbelly eelpout										
Bocaccio										
Butter sole			15.26	0.14	0.07	2.80			1.67	10.70
Canary rockfish										
Copper rockfish					3.74			13.04	0.62	
Curlfin sole					0.87		3.34	2.34		0.84
Dover sole						0.92				
English sole	3.56	0.30	3.77	12.38		243.00	0.46	0.34	22.32	14.32
Eulachon										
Flathead sole										
Greenstriped rockfish										
Kelp greenling					10.24		0.36	1.74	0.30	0.35
Lingcod					10.36	0.56	1.70	3.88	0.54	0.42
Longnose skate									2.46	
Pacific cod					0.48		64.36		35.38	26.14
Pacific hake										
Pacific halibut	33.22	23.64		15.74	12.26	6.88	26.64	14.88	37.72	9.24
Pacific ocean perch										
Pacific sand lance	0.03		0.15	1.30	0.29	0.02			0.01	
Pacific sanddab	0.17	0.10				9.26	0.38		2.14	0.26
Pacific staghorn sculpin						2.22				
Pacific tomcod						8.61			0.18	0.11
Petrale sole									14.12	2.08
Quillback rockfish					1.36			2.22	0.50	
Redbanded rockfish										
Redstripe rockfish										
Rex sole						0.98				
Rougheye rockfish										
Sablefish										
Sand sole	8.20	4.22	25.30	34.58	4.44	110.48	0.20	0.18	0.80	0.90
Sandpaper skate										
Sharpchin rockfish										
Shortspine thornyhead										
Silvergray rockfish										
Slender sole										
Snake prickleback	0.36	0.56	0.32			0.68				
Southern rock sole	14.85	6.00	6.22	11.14	29.58	18.48	13.34	1.76	31.26	14.06
Spiny dogfish	9.67	13.66	20.00	10.27		6.72				
Spotted ratfish				33.78	52.58	43.76	146.33	80.90	46.58	117.72
Starry flounder										
Sturgeon poacher			0.05	0.24		0.69				0.05
Walleye pollock	0.11									
Wattled eelpout										
Widow rockfish								0.02		
Yelloweye rockfish										
Yellowtail rockfish										
Other	18.53	10.97	11.76	5.74	1.05	9.49	1.94	5.10	2.41	4.82
Total	**93.27**	**84.65**	**125.43**	**125.31**	**127.32**	**496.03**	**272.27**	**141.66**	**332.15**	**232.05**

Appendix B continued.

Species	51	52	53	54	55	56	57	58	59	60
Aleutian skate										
Arrowtooth flounder	34.68	591.99	1220.53	348.33	16.80	71.76	49.73	69.34	23.10	30.98
Big skate										
Bigmouth sculpin										
Blackbelly eelpout				0.07			0.94			
Bocaccio										
Butter sole	0.35									
Canary rockfish									2.74	1.16
Copper rockfish									7.10	
Curlfin sole	1.06									0.66
Dover sole		7.50	65.52	39.31	3.06	14.98	12.74	107.52	0.56	
English sole	5.18	21.52	0.70	0.28	80.34	85.23	1.30	0.68	4.76	1.57
Eulachon		1.04	1.46	0.82	0.08		1.14	3.32		
Flathead sole			0.94	2.60	0.82	2.90	22.00	2.62		
Greenstriped rockfish							0.14	0.52		
Kelp greenling									4.48	1.53
Lingcod					0.42	0.04			1.58	3.40
Longnose skate							2.88			
Pacific cod	2.30	2.60	2.72	36.50	38.30	2.86		4.24	0.36	19.22
Pacific hake										
Pacific halibut		2.26			4.74	6.50		5.82	3.30	32.62
Pacific ocean perch										
Pacific sand lance										
Pacific sanddab	2.54				142.42	34.02	0.66			4.88
Pacific staghorn sculpin										
Pacific tomcod	0.11				48.68	0.06	0.34			
Petrale sole	1.96	1.30	1.60	0.93	52.02	4.00		0.30	0.36	
Quillback rockfish					5.52			1.26	12.98	0.91
Redbanded rockfish				3.15						
Redstripe rockfish									25.98	0.63
Rex sole	0.60	52.64	122.02	18.44	9.08	16.98	26.18	41.60	1.04	
Rougheye rockfish										
Sablefish	8.93	0.50	1.58		4.34	15.22		1.96		1365.68
Sand sole					0.38	0.18				
Sandpaper skate										
Sharpchin rockfish										
Shortspine thornyhead										
Silvergray rockfish		1.18	3.42	1.05				0.62	7.76	2.00
Slender sole				10.66	0.15		0.43	0.60		
Snake prickleback										
Southern rock sole	3.75				9.26	0.22		0.02	8.42	7.74
Spiny dogfish			0.20	7.98	8.02		5.84	8.48	7.98	
Spotted ratfish	77.47	19.52	15.72	9.44	53.06	27.62	10.36	7.82	5.86	17.23
Starry flounder										
Sturgeon poacher	0.20									
Walleye pollock	1.20	0.48	2.86	8.14	24.36		4.18	19.64		0.52
Wattled eelpout										
Widow rockfish					0.39					
Yelloweye rockfish										
Yellowtail rockfish								2.14	0.40	12.13
Other	2.44	1.02	0.21	0.47	15.16	2.24	1.00	0.22	6.60	14.24
Total	**142.77**	**703.55**	**1439.48**	**488.17**	**517.40**	**284.81**	**139.86**	**278.72**	**125.36**	**1517.10**

Appendix B continued.

Species	61	62	63	64	65	66	67	68	69	70
Aleutian skate										
Arrowtooth flounder		268.97	111.96	1.32		1.40	403.08	145.37	2528.38	569.85
Big skate	1.52					5.72		16.13	91.04	
Bigmouth sculpin										
Blackbelly eelpout										
Bocaccio							10.66			
Butter sole	0.30		0.18			9.18				
Canary rockfish										1.55
Copper rockfish										
Curlfin sole										
Dover sole		6.38	1.06				53.12	28.24	2.66	4.46
English sole	20.00	56.06	32.26	3.34	2.20	85.58	142.66	21.20	302.04	0.48
Eulachon		0.04	5.08							
Flathead sole		14.96	1.44				0.38			
Greenstriped rockfish										1.60
Kelp greenling	3.18				0.26					
Lingcod	3.70			0.10	7.18	0.72				28.62
Longnose skate										
Pacific cod	3.02	47.90	4.68	4.85	9.80	0.22	5.22	10.13	2.72	25.20
Pacific hake										
Pacific halibut		5.08	8.04	22.52	10.34	78.74	5.56	173.48	28.04	2.88
Pacific ocean perch										3.85
Pacific sand lance						0.54				
Pacific sanddab			2.80						0.36	
Pacific staghorn sculpin	0.72									
Pacific tomcod	1.26	4.68	4.20	0.16	0.12	0.68				
Petrale sole		0.82						2.64	1.46	
Quillback rockfish	3.16									
Redbanded rockfish										
Redstripe rockfish										
Rex sole		20.62	7.92				104.60	79.30	31.42	3.26
Rougheye rockfish										
Sablefish		2.68	17.34					0.36		
Sand sole	5.74		0.14	2.59	1.98	0.50				
Sandpaper skate										
Sharpchin rockfish										0.40
Shortspine thornyhead										1.20
Silvergray rockfish		1.88					0.86	1.33		142.64
Slender sole										
Snake prickleback	1.18			0.20	1.92	0.02	0.08			
Southern rock sole	198.72	1.16	1.30	10.12	83.46	81.62				
Spiny dogfish		16.12	5.82			3.94	15.58	21.47	3.56	6.06
Spotted ratfish	47.48	12.40	1.30	4.10	11.56	28.62	124.64	104.34	1.76	95.14
Starry flounder						193.22				
Sturgeon poacher	0.04									
Walleye pollock		36.26	14.48		1.25		98.88	8.70	1.90	342.97
Wattled eelpout										
Widow rockfish										6.14
Yelloweye rockfish										
Yellowtail rockfish								3.21		93.02
Other	11.11	1.39	0.53	25.27	22.01	48.53	3.74	0.28	0.01	0.68
Total	**301.13**	**497.40**	**234.53**	**74.57**	**152.08**	**539.23**	**969.06**	**616.18**	**2995.35**	**1330.00**

Appendix B continued.

Species	71	72	73	74	75	76	77	78	79	80
Aleutian skate										
Arrowtooth flounder	48.22	0.64	9.18		80.68	1109.51	12.52	193.24	147.30	5.89
Big skate										
Bigmouth sculpin	2.20									
Blackbelly eelpout										
Bocaccio	3.90		4.02						3.08	
Butter sole										
Canary rockfish	45.88		184.47		6.64	2.38			1.14	
Copper rockfish										
Curlfin sole							0.42			
Dover sole	0.38		0.52		0.81			0.78	7.05	0.61
English sole						33.18	2.70	0.58	15.06	
Eulachon									0.42	0.21
Flathead sole										
Greenstriped rockfish			1.15							0.16
Kelp greenling										
Lingcod	6.84							2.66	5.96	
Longnose skate									4.66	
Pacific cod	14.82		32.96		7.73	2.26	0.18	12.78	38.56	2.02
Pacific hake										
Pacific halibut	2.98				6.22	6.36	5.86		7.36	
Pacific ocean perch			8.50		0.04				0.22	1.26
Pacific sand lance										
Pacific sanddab						11.12	0.84			
Pacific staghorn sculpin										
Pacific tomcod										
Petrale sole					1.53	0.12			15.62	
Quillback rockfish							2.00			
Redbanded rockfish										14.77
Redstripe rockfish			14.24							
Rex sole	4.12		2.84		0.96	0.56	0.08		31.02	2.14
Rougheye rockfish										
Sablefish										
Sand sole										
Sandpaper skate										
Sharpchin rockfish	0.38		0.68							0.62
Shortspine thornyhead	0.98									1.58
Silvergray rockfish	224.25	5.62	134.26		0.74	3.62			22.34	2.32
Slender sole										
Snake prickleback										
Southern rock sole							1.12	0.72		
Spiny dogfish			0.97				1.62	69.66	24.58	5.67
Spotted ratfish	84.18	4.01	33.67		20.90	37.98	103.33	134.59	47.90	17.27
Starry flounder										
Sturgeon poacher							0.06			
Walleye pollock	6.46		0.58		2.91		0.30	7.07	1.68	11.10
Wattled eelpout										
Widow rockfish	2.10		15.18							
Yelloweye rockfish										
Yellowtail rockfish	61.78		115.80						7.62	34.80
Other	0.37	0.23	5.36		3.40	0.05	1.12	1.00	0.62	2.40
Total	**509.84**	**10.50**	**564.38**		**132.56**	**1207.14**	**132.15**	**423.08**	**382.19**	**102.82**

Appendix B continued.

Species	81	82	83	84	85	86	87	88	89	90
Aleutian skate										
Arrowtooth flounder	12.70	5.91	28.76	15.62	67.90	22.90	6.96	229.75	188.58	58.67
Big skate										
Bigmouth sculpin		3.59			3.58					
Blackbelly eelpout										
Bocaccio				4.24						
Butter sole										0.38
Canary rockfish								2.22		
Copper rockfish										
Curlfin sole										1.30
Dover sole	5.07	3.69	1.99	2.44	4.36	4.42	0.41	4.16	0.18	
English sole			1.17					26.50	27.24	1.34
Eulachon	0.03	0.07			0.10	0.58	0.04			
Flathead sole										
Greenstriped rockfish					5.34	0.44				
Kelp greenling										
Lingcod		11.05							6.06	
Longnose skate	4.83							7.22		
Pacific cod	7.84	11.47	25.50	17.74	14.94	4.44	10.94	7.10	11.00	10.02
Pacific hake	2.21					1.06				
Pacific halibut	10.05		12.28			6.66		3.53	3.58	21.30
Pacific ocean perch	8.91	2.51	2.76	0.22	0.10	0.32	1.98	0.34		
Pacific sand lance										
Pacific sanddab									0.14	0.34
Pacific staghorn sculpin										
Pacific tomcod										
Petrale sole								1.36	1.66	
Quillback rockfish										
Redbanded rockfish	22.41	15.82	4.76	7.16	3.26	12.98	2.16			
Redstripe rockfish										
Rex sole	4.28	5.55	5.00	1.92	36.34	16.50	11.88	21.06	6.44	
Rougheye rockfish		0.14								
Sablefish		7.80								
Sand sole										1.06
Sandpaper skate										
Sharpchin rockfish	0.82	0.54	0.24		0.68		0.13			
Shortspine thornyhead	9.37	21.81	0.68	0.92		3.64	1.12			
Silvergray rockfish	4.07	1.50	28.04	5.94	148.68	15.65	16.53	9.22	7.06	
Slender sole	0.24									
Snake prickleback										
Southern rock sole										10.76
Spiny dogfish	10.13	1.68	65.18	18.12	12.92	20.18	7.45	12.74	238.20	6.76
Spotted ratfish	20.25	13.86	40.68	25.50	33.18	26.90	27.75	54.20	39.98	18.58
Starry flounder										
Sturgeon poacher										
Walleye pollock	9.94	10.80	39.74	0.46	0.86	31.90	7.57	10.36	3.88	
Wattled eelpout										
Widow rockfish							2.37			
Yelloweye rockfish					4.78					
Yellowtail rockfish	6.86		59.49	14.30	60.42	15.46	10.29			
Other	2.67	2.54	1.94	3.41	1.56	2.83	3.16	0.15		
Total	**142.68**	**120.33**	**318.21**	**117.99**	**399.00**	**186.86**	**110.74**	**389.91**	**534.00**	**130.51**

Appendix B continued.

Species	91	92	93	94	95	96	97	98	99	100
Aleutian skate										
Arrowtooth flounder	70.84	119.78	55.42	9.20	79.32	145.99	306.60	248.86	214.70	464.64
Big skate										
Bigmouth sculpin										
Blackbelly eelpout									0.01	
Bocaccio		8.70								
Butter sole										
Canary rockfish				2.44				1.70		
Copper rockfish										
Curlfin sole										
Dover sole	3.62	8.52	11.24	13.51	33.14	6.40	12.46	0.76	4.58	11.60
English sole								77.10	291.06	63.76
Eulachon		0.05	2.59	2.39	17.05	0.50	0.36			
Flathead sole		0.56								1.24
Greenstriped rockfish										
Kelp greenling										
Lingcod								2.66	1.56	
Longnose skate			18.55							
Pacific cod	14.04	41.60	96.72		5.54	18.06	44.94	3.08	7.60	11.38
Pacific hake			1.65							
Pacific halibut	20.86		6.12		3.78	6.94		11.34	2.82	8.86
Pacific ocean perch		4.72	4.58	9.60	19.31	5.02				
Pacific sand lance										
Pacific sanddab								102.62		
Pacific staghorn sculpin										
Pacific tomcod								0.22		
Petrale sole								0.72	4.44	1.62
Quillback rockfish										
Redbanded rockfish		6.54	16.28	4.60	0.97	14.06				
Redstripe rockfish										
Rex sole	50.88	53.48	22.50	2.51	13.12	14.02	30.08	1.12	38.84	79.60
Rougheye rockfish				6.59	0.77					
Sablefish				3.16	6.40	0.60	0.58			
Sand sole										
Sandpaper skate	0.54	1.00					1.78			
Sharpchin rockfish						0.18				
Shortspine thornyhead				3.02	7.82					
Silvergray rockfish	7.16	38.40	17.50	1.45		118.46	7.58	4.10		
Slender sole										
Snake prickleback										
Southern rock sole										
Spiny dogfish	2.32	20.06	3.85	1.63	1.44	3.38	2.72	27.52	46.02	36.90
Spotted ratfish	16.60	66.38	12.09	14.34	11.56	28.58	60.80	24.46	477.89	221.28
Starry flounder										
Sturgeon poacher										
Walleye pollock	8.10	9.52	33.04	7.71	19.21	162.70	18.13	0.82	30.78	1.88
Wattled eelpout										
Widow rockfish										
Yelloweye rockfish										
Yellowtail rockfish	15.86	4.84	16.76			4.90				
Other	4.66	1.28	5.18	137.18	8.42	3.29	3.10	1.68		
Total	**215.48**	**385.43**	**324.07**	**219.33**	**227.85**	**533.08**	**489.13**	**508.76**	**1120.30**	**902.76**

Appendix B continued.

Species	101	102	103	104	105	106	107	108	109	110
Aleutian skate										
Arrowtooth flounder	99.38	66.30	171.52	107.14	245.61	183.75	409.90	1090.64	159.07	180.94
Big skate										
Bigmouth sculpin		3.78								
Blackbelly eelpout										0.82
Bocaccio										
Butter sole						33.88	1.98			
Canary rockfish	1.02									
Copper rockfish										
Curlfin sole										
Dover sole	18.02	4.04	8.50	25.54	99.23		62.38	14.98	185.41	103.86
English sole						108.94	188.64	79.04		
Eulachon	6.96		0.82	2.62	0.20				4.14	4.36
Flathead sole									6.04	7.66
Greenstriped rockfish										
Kelp greenling										
Lingcod						1.36		3.26		
Longnose skate		5.34		21.23					5.76	15.44
Pacific cod	11.38	21.08	5.76	2.50	29.80	594.40	5.66	5.02	0.94	3.92
Pacific hake			3.58	1.10	2.27					
Pacific halibut	8.90	6.40		2.40	3.66	12.70	35.58		6.54	21.56
Pacific ocean perch	13.58	5.68	368.45	37.26	58.90					0.50
Pacific sand lance										
Pacific sanddab					0.28			0.26		
Pacific staghorn sculpin										
Pacific tomcod										
Petrale sole						1.50	2.48	0.62		
Quillback rockfish										
Redbanded rockfish	0.86	7.94	7.77	12.48	24.52					
Redstripe rockfish										
Rex sole	23.14	10.28	29.02	3.07	20.37		68.07	97.20	16.62	10.94
Rougheye rockfish		2.12							1.72	
Sablefish				8.21			2.40		0.68	0.43
Sand sole										
Sandpaper skate						0.56	0.66		0.10	
Sharpchin rockfish		8.76	0.20		0.06					
Shortspine thornyhead	0.84	29.28	17.30	6.24	16.46				4.86	2.32
Silvergray rockfish	36.04	14.42	21.60		5.94					
Slender sole									2.30	2.08
Snake prickleback										
Southern rock sole										
Spiny dogfish	0.62		9.46	12.45	9.58		20.32	16.44		
Spotted ratfish	32.70	8.60	37.64	174.82	63.64		50.82	7.90	195.36	145.04
Starry flounder										
Sturgeon poacher										
Walleye pollock	60.32	0.92	69.96	1.12	37.77		3.88	0.02	1.68	
Wattled eelpout				0.93					1.06	0.84
Widow rockfish										
Yelloweye rockfish										
Yellowtail rockfish										
Other	3.06	12.84	16.71	5.66	1.96			0.46	7.60	7.83
Total	**316.82**	**207.78**	**768.29**	**424.77**	**620.25**	**937.09**	**852.77**	**1315.84**	**599.88**	**508.54**

Appendix B continued.

Species	111	112	113	114	115	116	117	118	119	120
Aleutian skate										
Arrowtooth flounder	161.08	53.06	26.74	21.16	14.78	60.20	97.48	75.20	196.34	154.21
Big skate							33.42			
Bigmouth sculpin										
Blackbelly eelpout	0.44									
Bocaccio										
Butter sole										
Canary rockfish										
Copper rockfish										
Curlfin sole										
Dover sole	97.96	60.98	70.44	24.86	38.26	98.08	439.70	231.92	125.04	2.88
English sole		0.42					1.80	0.74	1.76	
Eulachon	8.40	5.90			0.19	0.02	7.04	1.04	6.46	
Flathead sole	35.54	4.50				0.79	12.54	0.42	0.24	
Greenstriped rockfish										1.64
Kelp greenling										0.79
Lingcod						0.63				14.48
Longnose skate	27.32	11.92	18.70	4.74	2.48	1.93	14.60	18.40	4.78	
Pacific cod	2.16	2.96					16.92	5.78	8.62	19.32
Pacific hake			47.81	4.72	5.68	8.05	1.88	4.36	3.54	
Pacific halibut		13.68	29.18			8.52	18.80		35.10	
Pacific ocean perch	0.52	29.30	2.00	4.44	2.48	0.49			0.24	0.24
Pacific sand lance										
Pacific sanddab										0.52
Pacific staghorn sculpin										
Pacific tomcod										
Petrale sole			0.48						2.30	
Quillback rockfish									1.34	12.20
Redbanded rockfish			0.96	1.46	2.00	3.12			0.84	
Redstripe rockfish										
Rex sole	18.34	15.16	18.92	1.90	7.96	9.14	22.42	71.26	17.68	
Rougheye rockfish	1.00	6.00		2.36	2.22					
Sablefish	0.86		92.53	4.96	20.14	2.04	1.18	3.48	5.04	
Sand sole										
Sandpaper skate				12.96		1.35	4.90	2.96		
Sharpchin rockfish										
Shortspine thornyhead		2.88	14.96	6.92	22.00	3.49	0.94			
Silvergray rockfish										
Slender sole	2.22	1.52								
Snake prickleback										
Southern rock sole							1.26			
Spiny dogfish			3.10	3.74	3.52	2.27	4.02	1.40	6.24	2.33
Spotted ratfish	113.10	139.26	18.48	21.32	21.84	150.20	404.16	46.94	326.24	615.97
Starry flounder										
Sturgeon poacher										
Walleye pollock		21.44	8.40	17.92	4.76	2.14	38.62	8.54	12.36	4.97
Wattled eelpout	3.32	0.17					0.66	0.80		
Widow rockfish										
Yelloweye rockfish										
Yellowtail rockfish		7.50								
Other	30.64	3.05	12.08	15.01	13.04	5.05	3.10	6.79	22.31	6.57
Total	**502.90**	**379.70**	**364.78**	**148.47**	**161.35**	**357.51**	**1125.44**	**480.03**	**776.47**	**836.12**

Appendix B continued.

Species	121	122	123	124	125	126	127	128	129	130
Aleutian skate										
Arrowtooth flounder		160.24	573.63	228.26			1.62			
Big skate					6.42					4.69
Bigmouth sculpin										
Blackbelly eelpout		0.08								
Bocaccio										
Butter sole	0.02		4.90	3.72	35.30					
Canary rockfish										
Copper rockfish									0.86	1.68
Curlfin sole					0.44				0.89	0.35
Dover sole		0.44	0.70	4.30						
English sole	0.05	162.22	36.94	7.22	29.26	10.86	2.08		0.03	
Eulachon										
Flathead sole		5.48	50.12	18.42						
Greenstriped rockfish										
Kelp greenling								3.82		1.76
Lingcod	2.45	0.29				0.50	1.18	3.82		1.92
Longnose skate										
Pacific cod	0.16	13.97	47.66	3.42		0.15	0.01	3.50		0.69
Pacific hake										
Pacific halibut	7.19	2.86	17.72		10.30	51.50	37.46	8.36	21.22	15.20
Pacific ocean perch										
Pacific sand lance									10.47	
Pacific sanddab				1.46						
Pacific staghorn sculpin					1.04	0.66				
Pacific tomcod			0.72	0.50	54.48					
Petrale sole		0.48		0.42						
Quillback rockfish			1.04					1.70		8.39
Redbanded rockfish										
Redstripe rockfish		0.37								
Rex sole		2.25	9.64	53.52						
Rougheye rockfish										
Sablefish		582.97	1675.24							
Sand sole	2.14	0.32			29.00	4.68	4.92		2.07	2.15
Sandpaper skate										
Sharpchin rockfish										
Shortspine thornyhead										
Silvergray rockfish				1.08						
Slender sole				0.12						
Snake prickleback						5.14	1.28			
Southern rock sole	14.95	115.08	1.84	4.06	2.25	23.16	6.30	5.02	22.50	3.88
Spiny dogfish		3.54	9.62	5.92	2.10	2.86		0.78	0.47	1.84
Spotted ratfish	1.41	38.48	7.06	5.16		190.48	95.32	664.14	448.53	104.04
Starry flounder									1.20	
Sturgeon poacher					0.39	0.44	0.03			
Walleye pollock		14.36	82.68	304.52						
Wattled eelpout										
Widow rockfish										
Yelloweye rockfish										
Yellowtail rockfish										
Other	1.33	4.66	1.06	1.00	18.20	65.12	30.68	4.87	0.46	2.55
Total	**29.70**	**1108.09**	**2520.57**	**643.10**	**189.18**	**355.55**	**180.88**	**696.01**	**508.70**	**149.14**

Appendix B continued.

Species	131	132	133	134	135	136	137	138	139	140
Aleutian skate										
Arrowtooth flounder		866.33	34.50	44.54	61.02	266.62	78.34			
Big skate										6.17
Bigmouth sculpin										
Blackbelly eelpout			0.10	0.12	0.18					
Bocaccio										
Butter sole			0.16						0.41	
Canary rockfish										
Copper rockfish										
Curlfin sole										
Dover sole		42.37	5.00	1.88	5.94	120.22	2.14		0.17	
English sole		27.80	11.26	7.66	17.84		10.90	1.90	101.12	1.87
Eulachon		7.60				0.54				
Flathead sole			0.68	0.10	1.08	6.70				
Greenstriped rockfish										
Kelp greenling									1.85	0.33
Lingcod	0.50								2.17	1.20
Longnose skate										
Pacific cod		2.45	8.36	2.10	41.04	3.80	7.40		2.20	0.96
Pacific hake										
Pacific halibut	4.12					5.22	6.74	24.24	9.81	15.52
Pacific ocean perch						0.01				
Pacific sand lance								0.02		
Pacific sanddab			2.82	0.50			2.76		32.54	
Pacific staghorn sculpin										
Pacific tomcod					0.16				29.17	
Petrale sole			3.18	0.46	3.28		11.72			
Quillback rockfish			0.92							
Redbanded rockfish										
Redstripe rockfish										
Rex sole		85.84	99.72	100.26	112.42	146.76	33.94			
Rougheye rockfish										
Sablefish		0.75	2.36	1.62		2.82	1.84			
Sand sole								1.20	14.11	0.26
Sandpaper skate										
Sharpchin rockfish										
Shortspine thornyhead										
Silvergray rockfish		4.07				5.24				
Slender sole					0.84	0.54				
Snake prickleback								0.10		0.12
Southern rock sole	2.98			0.30				22.46	20.38	23.46
Spiny dogfish			4.52	1.10	2.50	6.76	13.10			4.60
Spotted ratfish	71.56	18.86	5.02	4.18	5.38	2.36	6.10	31.64	10.85	6.39
Starry flounder										
Sturgeon poacher				0.22	0.12		0.14	0.06	0.08	
Walleye pollock			1.28	3.10	0.94	1.18				
Wattled eelpout										
Widow rockfish										
Yelloweye rockfish										
Yellowtail rockfish										
Other	4.85	2.91	2.81	2.16	2.34	3.39	3.58	5.37	8.85	2.88
Total	**84.01**	**1058.98**	**182.69**	**170.30**	**255.08**	**572.16**	**178.70**	**86.99**	**233.71**	**63.76**

Appendix B continued.

Species	141	142	143	144	145	146	147	148	149	150
Aleutian skate										
Arrowtooth flounder			3.72			0.14		1.16	36.08	119.56
Big skate	4.24									
Bigmouth sculpin										
Blackbelly eelpout										0.46
Bocaccio										
Butter sole					0.48			0.44		
Canary rockfish										
Copper rockfish	7.74									
Curlfin sole			1.16			1.83				
Dover sole			0.30						0.62	15.08
English sole	0.86		34.94		117.51	0.79	38.05	31.72	2.10	6.96
Eulachon										
Flathead sole									0.01	22.82
Greenstriped rockfish									0.47	
Kelp greenling	1.08									
Lingcod	6.76	0.90	32.59					2.16	4.03	
Longnose skate										
Pacific cod		0.01	845.38	0.56				4.76	1.98	4.94
Pacific hake										
Pacific halibut	80.36		6.20		8.14	13.12		6.30		
Pacific ocean perch									2.38	
Pacific sand lance		0.34	0.09	3.66			4.75			
Pacific sanddab			14.69		1.00		0.14	0.16		
Pacific staghorn sculpin										
Pacific tomcod								0.40		
Petrale sole			1.89					24.24	0.65	2.04
Quillback rockfish	1.74		0.41						6.81	
Redbanded rockfish										
Redstripe rockfish										
Rex sole			0.20					2.23	13.71	102.24
Rougheye rockfish										
Sablefish			29.26							4.56
Sand sole	0.14	1.69	0.76	4.09	38.84	0.18	12.04			
Sandpaper skate										
Sharpchin rockfish										
Shortspine thornyhead										
Silvergray rockfish									4.45	
Slender sole										0.92
Snake prickleback		0.13								
Southern rock sole	46.90	9.28	3.75	106.66	38.12	3.71	73.63	0.55		
Spiny dogfish	1.64		9.88			7.76	3.20	17.14	18.91	5.38
Spotted ratfish	12.02		79.66	18.44		0.53	0.77	0.48	2.53	7.22
Starry flounder										
Sturgeon poacher	0.02		1.34	0.09	0.07		0.14			
Walleye pollock			1.80						0.78	
Wattled eelpout										
Widow rockfish										
Yelloweye rockfish										
Yellowtail rockfish	0.88									
Other	4.46	4.44	4.87	0.59	1.47	8.22	2.15	0.62	1.52	4.24
Total	**168.84**	**16.79**	**1072.89**	**134.09**	**205.63**	**36.28**	**134.87**	**92.36**	**97.03**	**296.42**

Appendix B continued.

Species	151	152	153	154	155	156	157	158	159	160
Aleutian skate										
Arrowtooth flounder	186.98	132.64	18.26	17.88				8.14	85.65	32.72
Big skate										
Bigmouth sculpin										
Blackbelly eelpout	0.10	0.40								0.02
Bocaccio										
Butter sole										
Canary rockfish						0.40				
Copper rockfish					0.02	0.95				
Curlfin sole										
Dover sole	20.04	10.74	9.82	31.26				0.86	23.00	9.46
English sole	50.82	20.50						3.36		
Eulachon			0.47	1.16					6.40	11.90
Flathead sole	7.00	9.48	0.14	12.73				0.16	5.47	0.43
Greenstriped rockfish										
Kelp greenling						1.54				
Lingcod	14.48				5.46	0.20	2.86	2.36		8.27
Longnose skate				1.32						6.10
Pacific cod	0.48						0.48			
Pacific hake				6.76					0.91	5.58
Pacific halibut		4.32			1.10		53.16			
Pacific ocean perch				6.94					0.21	10.63
Pacific sand lance					8.36	0.48	0.10	0.16		
Pacific sanddab										
Pacific staghorn sculpin										
Pacific tomcod										
Petrale sole	2.04	0.46						1.20		0.75
Quillback rockfish					0.36	1.49				
Redbanded rockfish			0.97	7.22					7.54	34.81
Redstripe rockfish										
Rex sole	84.46	83.64	0.45	13.52				38.56	9.81	1.72
Rougheye rockfish				2.36						0.94
Sablefish	3.48	4.14	1.28	5.54					0.68	
Sand sole										
Sandpaper skate				0.48						
Sharpchin rockfish										
Shortspine thornyhead				1.37						0.64
Silvergray rockfish										2.26
Slender sole	0.16	1.04	0.65	3.51				0.24	0.13	0.55
Snake prickleback								0.02		
Southern rock sole					12.16	3.74	4.48			
Spiny dogfish	50.18	5.48	10.75			1.48		8.50	1.44	1.25
Spotted ratfish	4.12	2.10	2.67	1.34	69.98	26.56	52.46	6.74		1.71
Starry flounder										
Sturgeon poacher										
Walleye pollock			3.10					0.14		
Wattled eelpout										
Widow rockfish										
Yelloweye rockfish										
Yellowtail rockfish			2.10							
Other	0.56	4.17	3.22	8.06	3.28	0.63	0.58	1.92	8.60	6.11
Total	**424.9**	**279.11**	**53.88**	**121.45**	**100.72**	**37.47**	**114.12**	**72.36**	**149.84**	**135.85**

Appendix B continued.

Species	161	162	163
Aleutian skate			
Arrowtooth flounder	48.84	27.82	21.44
Big skate			
Bigmouth sculpin	0.02		
Blackbelly eelpout	0.21	1.9	1.3
Bocaccio			
Butter sole			
Canary rockfish			
Copper rockfish			
Curlfin sole			
Dover sole	13.78	19.87	17.21
English sole			
Eulachon	5.18		2.85
Flathead sole	49.08	41.66	37.2
Greenstriped rockfish			
Kelp greenling			
Lingcod		5.15	
Longnose skate			14.58
Pacific cod	1.79	2.23	18.8
Pacific hake			0.85
Pacific halibut			
Pacific ocean perch	1.88	0.74	5.26
Pacific sand lance			
Pacific sanddab			
Pacific staghorn sculpin			
Pacific tomcod			
Petrale sole		0.61	2.34
Quillback rockfish			
Redbanded rockfish	3.52	10.11	65.95
Redstripe rockfish		0.44	
Rex sole	16.46	44.81	32.84
Rougheye rockfish			
Sablefish	2.66		4.88
Sand sole			
Sandpaper skate			
Sharpchin rockfish			
Shortspine thornyhead			
Silvergray rockfish	13.3	22.63	67.38
Slender sole	3.04	1.6	2.74
Snake prickleback			
Southern rock sole			
Spiny dogfish		1.22	1.27
Spotted ratfish		0.74	0.29
Starry flounder			
Sturgeon poacher			
Walleye pollock			5.83
Wattled eelpout			
Widow rockfish			
Yelloweye rockfish			
Yellowtail rockfish			1.69
Other	24.01	8.62	5.59
Total	**183.77**	**190.15**	**310.29**